COMPUTERWORLD

SPECIAL 25TH ANNIVERSARY EDITION

INSIDE

Images of the future from 25 computing visionaries:

Gene Amdahl ■ Gordon Bell ■ Dan Bricklin ■ Edgar F. Codd ■ Seymour Cray
J. Presper Eckert ■ Douglas Engelbart ■ Bill Gates ■ Harold Greene
Andy Grove ■ Max Hopper ■ Katherine Hudson ■ Steve Jobs
Philippe Kahn ■ Mitch Kapor ■ Alan Kay ■ James Martin ■ Bill McGowan
Scott McNealy ■ Robert Metcalfe ■ Ken Olsen ■ H. Ross Perot
Ben Rosen ■ Charles Wang ■ Tom Watson

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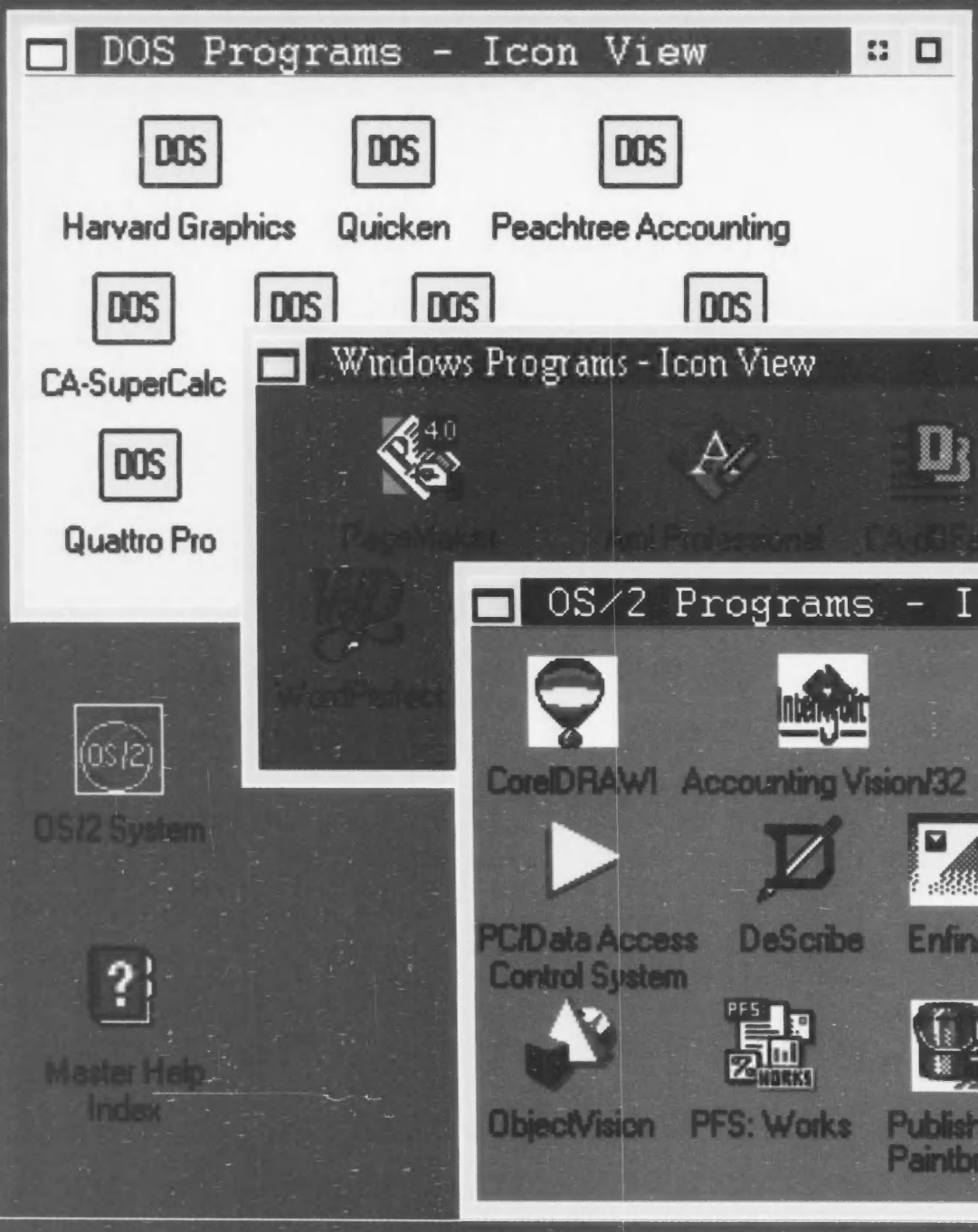

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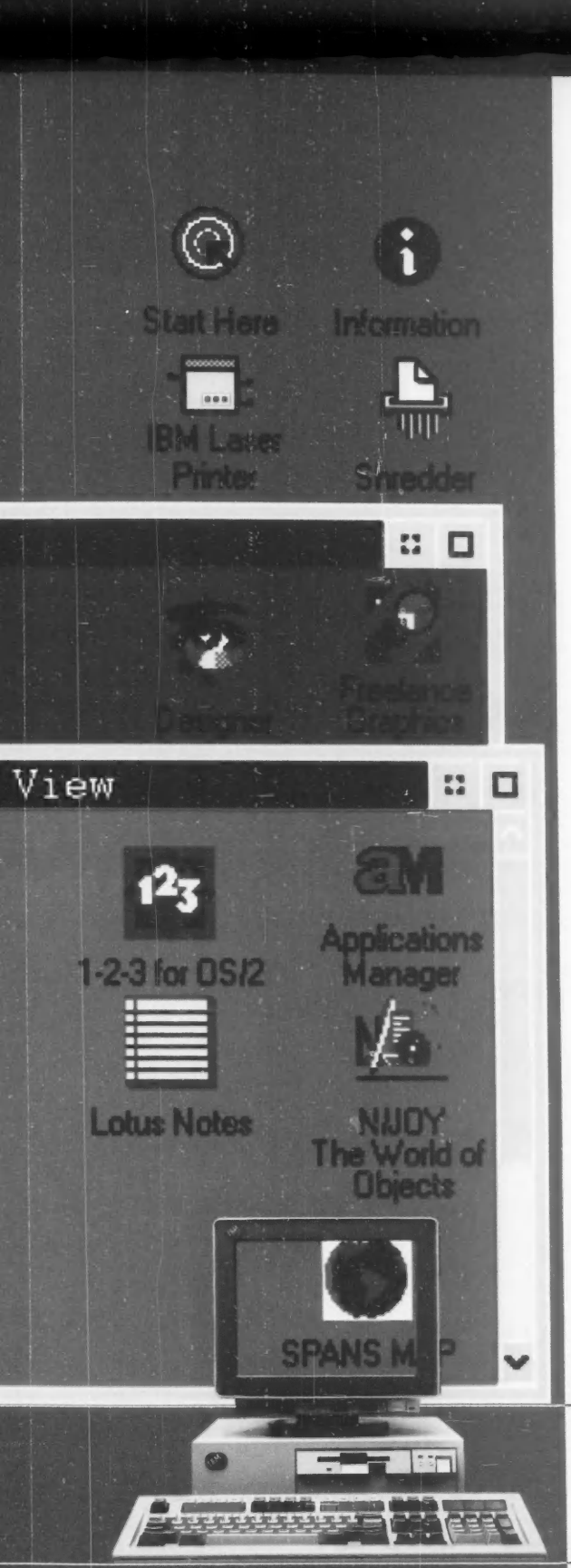

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THE NEWSPAPER OF INFORMATION SYSTEMS MANAGEMENT
June 22, 1992 · Vol. XXVI · No. 25 · 234 Pages · $2/Copy · $48/Year

COMPUTERWORLD

Humana tries Unix-based imaging pill

A three-year payback seen for $10M project

BY ELLIS BOOKER
CW STAFF

LOUISVILLE, Ky. — Health care and insurance giant Humana, Inc. is prepping itself for what may be the largest Unix-based document imaging installation in the country.

The $10 million, two-year project will use an imaging system from Image Business Systems Corp. to outfit Humana's entire claims operation.

Ultimately, that system, which is slated to roll out in October, will support 700 to 800 data entry clerks and professional claims adjusters at Humana's claims processing centers here, in Jacksonville, Fla., and in San Antonio. Each employee will be equipped with an image-enabled IBM Personal System/2 workstation running Microsoft Corp.'s Windows and tied to multiple IBM RISC System/6000 Unix servers.

Pilot working

Imaging has been under evaluation at Humana for three years, according to company executives, who said they have demonstrated that the technology reduces administrative overhead. Based on the experience derived from a year-old, 25-workstation pilot system from Image Business Systems, Humana executives said they expect a three-year payback on the project.

"We've seen a net 25% to

Continued on page 16

Hertz mulls outsourcing rescue

BY MARK HALPER
CW STAFF

OKLAHOMA CITY — The Hertz Corp. is considering outsourcing its data center, a move that one source said would cost more than processing data internally but could land the company up-front revenue from the sale of its coveted software.

Ed Klein, vice president of materials and support services at the Park Ridge, N.J.-based car rental company, said last week that Hertz may outsource its 650 MIPS data center here as part of a corporatewide effort to reduce costs in the midst of what until recently was a severe slump in the travel industry.

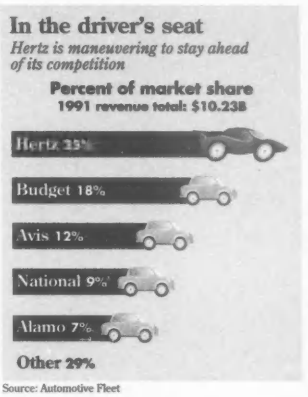
Klein declined to say what measures other than outsourcing the company would take to reduce data center costs, which a source close to Hertz estimated at between $40 million and $80 million per year.

An outsourcing solution would actually cost the company more, or between $50 million and $100 million a year, said the source, who added that a Nolan, Norton & Co. study commissioned by Hertz concluded that outsourcing would be more expensive.

A Hertz spokesman said the evaluation "is a very sensitive topic" that the company will be able to discuss more freely at a later date.

The sensitivity is believed to relate to a potential loss of jobs at the approximately 500-person shop, the sale of proprietary software assets and the potential involvement of Electronic Data Systems Corp. — which is owned by General Motors Corp. — with Hertz, which is 49%

Continued on page 10



IBM Escon made more affordable

Upgrade cuts number of channels required

BY JOHANNA AMBROSIO
CW STAFF

WHITE PLAINS, N.Y. — For the first time, IBM has given mainframe customers a significant financial incentive to adopt its Escon fiber-optic architecture: more bang for the buck.

Users and analysts said last week's upgrade reduces the number of channels needed in Escon-equipped host computers and provides a long-awaited dollars-and-cents reason to migrate to Escon.

Observers see Escon as critical to IBM's mainframe success during this decade and beyond.

"Anytime you offer customers considerable savings or a fourfold reduction in the number of channels they need, it will get their attention," said Robert Djurdjevic, president of Annex Research in Phoenix.

On the fence

Customers seemed intrigued, although few were willing to categorically commit to Escon on the basis of last week's announcement. "We've been looking at Escon, but we have no specific plans to implement it because it costs too much," said James Matsey, corporate director

Continued on page 12

25 years of computing innovations

In addition to this week's enclosed supplement featuring interviews with 25 computing pioneers, *Computerworld* is celebrating its 25th anniversary with stories that trace the evolution of information management and desktop computing over the last 2½ decades (see page 20). We have also written a story that touches on key events and problems to be solved during the next computing millennium.

The time line starting on the right takes readers on a jaunt down computing's memory lane, stopping to celebrate a few momentous occasions along the way.

Selected milestones in the last quarter-century of computing:
1967
✓ IBM's 360/25
1968
✓ First 16-bit mini (Data General)
✓ First software patent issued (Applied Data Research)
1969
✓ IBM charged with antitrust by U.S.; unbundles software
✓ AT&T's Unix debuts
1970
✓ System Network Architecture debuts
✓ DEC's PDP-11/20
1971
✓ First floppy disk
✓ First microprocessor (Intel 4004)
(Continued on page 20)

Missing tools won't delay client/server

Early adopters of distributed computing say benefits outweigh pitfalls

BY JOANIE M. WEXLER
CW STAFF

SAN JOSE, Calif. — Information services professionals migrating their companies to open, distributed computing environments bemoaned a deficit of development tools and programming expertise last week during an Xhibition '92 conference session here.

Uncertainties concerning several issues — managing the planning and implementation processes, turning interdepartmental turf wars into partnerships and working around immature enterprise management systems — also reared their heads as high-profile distributed computing challenges.

Nevertheless, the 100 session attendees unanimously agreed that the benefits of distributed computing are worth the travails. As evidence, they cited as expected gains vendor independence, a broader sharing of corporate information, reduced hardware costs and the ability to add hardware and applications incrementally.

For example, "cost was a big impetus for change" at Anchorage, Alaska-based British Petroleum Explorations, said Michael Kettleson, the company's principal consultant for information technology. The company expects to complete its client/server migration by the end of this year, he said.

British Petroleum's $1.5 million investment in Unix workstations — which will assume the former processing role of nine Digital Equipment Corp. VAXs and 50% of the processing of a Cray Research, Inc. supercomputer — is expected to yield a $2.5 million annual operating

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INSIDE

CW's anniversary supplement: 25 computing innovators. Follows page 92.

Compaq's low-cost PCs debut; competitors respond with price cuts. Page 4.

PC Expo highlights accelerators for graphical computing. Page 8.

Product Spotlight — There are still some ups and downs facing notebook computer users. Page 111.

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4 **WordPerfect** to stress integration, company execs say.

4 Early users laud **Lotus'** Ami Pro 3.0 word processor.

6 Thomas Pettibone, former **P&G** CIO, has landed at **Philip Morris.**

8 **PC Expo** has no extravaganza planned for its 10th anniversary, but plenty of product announcements are in store.

8 **Lotus** plans to release an updated version of Symphony in the next few weeks.

12 **IBM** announces TCP/IP Version 2.2 for MVS.

14 **Oracle** officially introduces Oracle 7 of its RDBMS.

14 **USL** unveils Unix System V Release 4.2 — and makes peace with the **OSF.**

16 **Wang** is expected to announce an imaging system for IBM's RS/6000.

20 A simple walk down Main Street USA reveals the many ways computers have changed society in the past 25 years.

24 **HP** comes out with ISDN interfaces for PCs and Apollo 9000 workstations.

24 A jury rules that **AMD** will have to rewrite some code it borrowed from **Intel.**

Quotable

"We're just getting PCs on everybody's desk. Fundamentally, the revolution will come in the next 25 years."

ESTHER DYSON
EDITOR, "RELEASE 1.0"

On the status of PCs in the information technology sphere. See story page 20.

DESKTOP COMPUTING

37 **Lotus** and **Dell Computer** release personal information managers.

WORKGROUP COMPUTING

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The 5th Wave

"YES, WE STILL HAVE A FEW BUGS IN THE WORD PROCESSING SOFTWARE. BY THE WAY, HERE'S A MEMO FROM MARKETING."

EXECUTIVE BRIEFING

■ **This fall, health care and insurance giant Humana will launch a $10 million** Unix-based document imaging project to outfit its entire claims operation. The Louisville, Ky.-based firm's system will eventually support up to 800 clerks and claims adjusters working on image-enabled IBM PS/2 workstations tied to multiple IBM RS/6000 Unix servers. **Page 1.**

■ **Check out the information systems at any Wal-Mart store,** and you'll see just how far the IS field has come since 1967. Wal-Mart's private satellite network and just-in-time inventory management system are a far cry from the days of computerizing the accounting function just to eliminate clerks. Yet there have been some disappointments along the way. **Page 20.**

■ **Mainframe customers may finally have a dollars-and-cents reason** to migrate to IBM's Escon fiber-optic architecture, thanks to technology that reduces the number of channels required. **Page 1.**

■ **Reversing its previous stance on IBM's OS/2, CA** will reportedly support the desktop operating system with rewritten Windows applications, including CA-Realizer, CA-dBfast, CA-Unicenter, CA-SuperProject and CA-Compete for OS/2 2.0. **Page 8.**

■ **Car rental leader Hertz is considering outsourcing** its data center even though, one insider said, the move could cost the company more than doing the job itself. **Page 1.**

■ **Compaq's new product blitz has stirred up the industry** with unprecedented low prices. **Page 4.** Compaq is also setting out its strategy in the network server market. **Page 49.**

■ **Peace is busting out all over the Unix industry these days** with the introduction of USL's much-ballyhooed desktop Unix System V Release 4.2. **Page 14.**

■ **The 10th PC Expo in New York opens this week as a showcase** for several revamped lines of computers and products designed to speed up graphical displays. **Page 8.**

■ **Relying on GUIs, intelligent E-mail and interactive video technology,** inquiry centers provide an environment where users and suppliers can work together. **Page 133.**

■ **Users are finding that this year's crop of notebook computers** comes close to obliterating the usual notebook annoyances — such as squint-inducing screens, skimpy hard disks and long recharge times. **Page 111.**

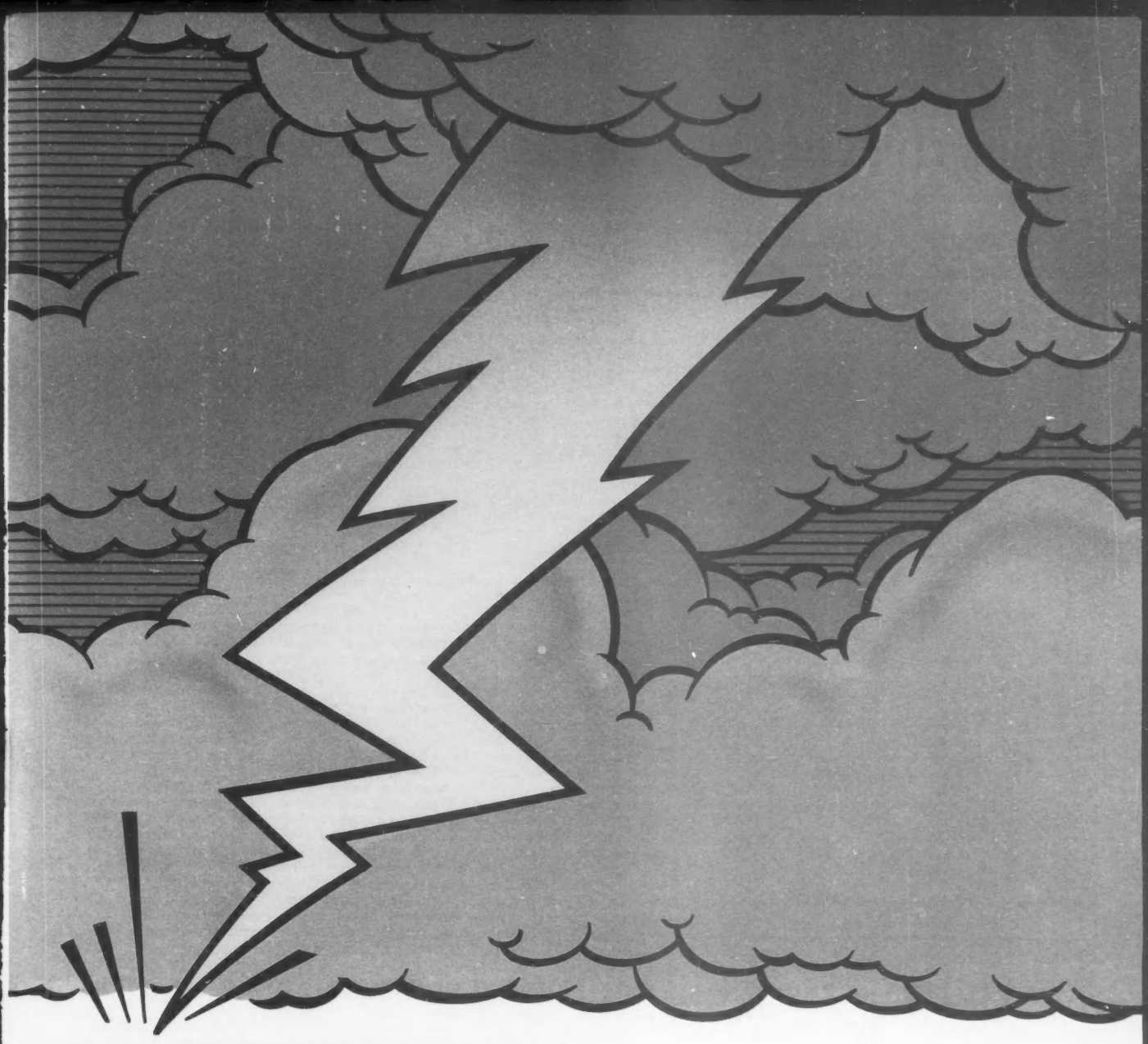
■ **Electronic distribution of PC software** could save companies headaches, not to mention sore feet if the users are still on "Sneakernet." **Page 37.**

■ **One more step in the preparations for Alpha** has Digital Equipment Corporation readying a series of migration software tools. **Page 95.**

■ **Users concerned about the quality of their client/server applications** are starting to see testing tools appear on the market. **Page 103.**

■ **Information technology could spell still greater changes** for the retail industry, forcing retailers to choose between being low-cost suppliers that rely on technology and traditionalists with an image of the old days. **Page 28.**

■ **On site this week:** Unix-based systems distributed throughout the country are deep in the heart of Plano, Texas-based PageNet, which is finding ways to improve customer service. **Page 49.** Rather than rely on long-range communications to a host computer, US Air is installing fault-tolerant local-area networks at its new Pittsburgh terminal. **Page 81.** Taco Bell has cut expenses from its operations budget through strategies such as renegotiating contracts. **Page 95.**



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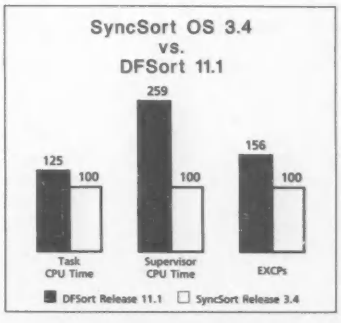

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Compaq redefines PC low end

Radical product revamp, low pricing latest salvo in war with clone makers

BY CAROL HILDEBRAND
CW STAFF

NEW YORK — The last of the premium performers recognized the supremacy of the price tag last week, as Compaq Computer Corp. launched a flotilla of personal computers priced as low as $899 for an 80386SX desktop machine.

The announcement, which the company said was its largest ever, introduced 41 products ranging across two new desktop lines and a family of notebooks — each targeting different market sectors ranging from home to price-conscious corporate users [CW, May 25].

Compaq aggressively highlighted the price differentials in its presentation, pointing out, for example, that its I486 33-MHz ProLinea undercut similar Dell Computer Corp. and AST Research, Inc. offerings by $200 and $500, respectively.

Such positioning triggered a string of assurances from competitors that they would match the move (see related story). This led to predictions that users are in for a summer of watching more digits disappear from PC prices.

Compaq said it anticipated such clone response and that more price reductions will be forthcoming. "We don't expect Compaq to remain $500 below [clones], but we felt we had to step out strong," said Ross Cooley, senior vice president at Compaq North America.

A needed change

Compaq's change of heart came none too soon: Since April 1991, the company has lost about 16% revenue share. CW Database Division numbers showed that of 330 users with Compaq as a primary vendor, 197 planned to stick with it, but 133 were either ditching Compaq or did not state their intentions.

"Compaq's move signals a fundamental shift in how the PC industry will be structured," said Richard Zwetchkenbaum, an analyst at International Data Corp. in Framingham, Mass. He predicted that shrinking gross margins will squeeze out many third-tier players.

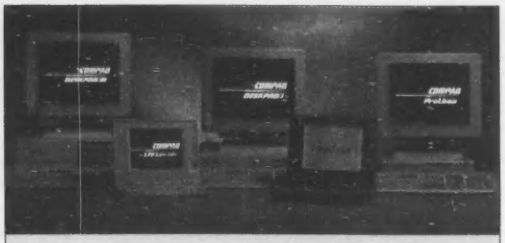
Charline Avey, a network manager at the engineering group at Indianapolis Water Co., is not waiting for the fallout. Although pricing concerns had left her on the verge of buying some clones, she said, Compaq's new pricing resulted in her yanking a clone purchase order and putting "through requisition orders for ProLineas for two of the workstations. I'm very, very impressed with the pricing," she added.

Some users are concerned that with Compaq's new focus on producing low-cost machines, the company's much-vaunted quality would disappear. However, Kevin Caine, manager of end-user technology at Progressive Insurance Corp., who said he has looked under the hood of a ProLinea, claimed: "There is no difference between them and a Compaq high-end box.

Caine said he remained most intrigued with the DeskPro/I series (see chart), with its Business Audio feature that allows Windows users to attach voice annotations to applications. "We had been toying with the idea of integrated audio, and now we have the opportunity," he said.

The DeskPro/I series is targeted more at midrange corporate users who remain price-sensitive. The "I" series is processor-upgradable, with QVision graphics controllers and Business Audio on board as well. The Contura notebook family is aimed at a dollar-conscious audience, with pricing starting around $1,700.

Compaq also announced bundled Windows editions for the new lines and DeskPro/Ms.



All in the families

Compaq is aiming across the board with three families of computers priced to fit varying user needs. What follows are representative models of the three families:

	RAM	Processor	Storage	Price
Compaq Contura 3/20 Model 40	2M bytes	386SL/20	40M bytes	$1,699
Compaq ProLinea 3/25ZS Model 40	2M bytes	386SX/25	40M bytes	$899
Compaq DeskPro 3/25I Model 84	4M bytes	386DX/25	84M bytes	$1,779

All models have MS-DOS 5.0 preinstalled and a 3½-in., 1.44M-byte floppy disk drive. DeskPro/I models also include QVision graphics controller and Business Audio with microphone.

No surprise

Compaq's announcement of a wide array of low-priced products slammed down on the industry like a tidal wave, provoking a seemingly frenzied response from scrambling clone vendors. But analysts said the reaction was preplanned.

"It's more like the airfare wars — a major player sets the tone, and the competition has no choice but to follow," said Robert Corpuz, an analyst at Dataquest, Inc.

Among the responses unveiled last week were the following:

- **IBM** is expected to cut prices next week.
- **Dell** showed a new line of low-cost PCs to customers. These products are slated to appear next week.
- **Toshiba America Information Systems, Inc.** said it will cut prices today by up to 24% on its notebook line.
- **Everex Systems, Inc.** said it will introduce tomorrow 19 new products, ranging from low-end products to a fault-tolerant multiprocessing server.
- **Hyundai Electronics America's Information Systems Division** cut prices up to 40% on its current line to match Compaq on the low end and added a monochrome Video Graphics Array monitor.
- **Advanced Logic Research, Inc.** this week cut prices to below Compaq's levels.

Lotus' Ami Pro looks smart to users; 20% to 30% faster

BY THOMAS HOFFMAN
CW STAFF

NEW YORK — Lotus Development Corp. gave away more than 200 copies of the Ami Pro 3.0 word processor to the NYPC User Group last week, but those who saw the demonstration said Lotus should have no trouble selling the product.

"It seems a lot easier to work with than [Microsoft's] Word for Windows," said Michael Connolly, an independent software consultant based here.

"I have WordPerfect 5.0, and it's a bear to work with. I was impressed with the Ami Pro 3.0 demonstration," said Paul Dubois, a NYPC user group member and independent consultant.

The Windows-based Ami Pro 3.0 features drag-and-drop editing, allowing users to move text around a document by dragging it with a mouse. Lotus Chairman Jim Manzi said Ami Pro 3.0 is also 20% to 30% faster than previous versions.

Ami Pro's selection of different icon sizes is useful for users who have black-and-white Video Graphics Array screens, said one attendee requesting anonymity.

However, Ami Pro 3.0 takes up more than 14M bytes of hard disk space. That is in line with WordPerfect Corp.'s WordPerfect 5.0 and Microsoft Corp.'s Word for Windows, which use more than 15M bytes of disk space, said Bill Jones, product manager at Lotus.

Ami Pro's high storage requirement stems from the grammar checker and a new spell checker, he said.

Ami Pro 3.0, scheduled to ship in next month, is priced at $495. Users can trade in competitive software for Ami Pro 3.0 for $129; Ami Pro 2.0 users can upgrade for $79.

WordPerfect shares plans for future

BY CAROL HILDEBRAND
CW STAFF

NEW YORK — In an effort to silence rumors about its recent restructuring, WordPerfect Corp. last week outlined its future directions, introduced a new board and announced several strategic alliances.

The company will move from an emphasis on information processing to integrating information sharing and presentation.

Electronic mail, gateways, group scheduling, calendaring and document management are all under development or expansion at the company, executives said. Also announced was the Customer Advantage Program, a new large-user licensing package.

High on the agenda was the Orem, Utah-based company's denial that the 7-month-old Microsoft Corp. Windows version of its flagship word processor was not doing well in the market.

According to Dan Lunt, vice president of marketing, the company had recently notched its 1 millionth WordPerfect Windows sale. Lunt also said the company would continue with its multiplatform strategy. Its core engine code reportedly can be ported easily from one platform to another.

Changing focus

WordPerfect President Alan Ashton outlined a new emphasis on strategic relationships, which analysts said should help the company fend off Microsoft. He added that WordPerfect will consider bundling agreements when feasible.

While acknowledging that WordPerfect is in discussions with Lotus Development Corp. and Borland International, Inc., Ashton also announced the following alliances:

- WordPerfect last week acquired MagicSoft, Inc., which developed the communications program for WordPerfect Works. The technology will let WordPerfect communicate across multiple platforms more easily.
- Adobe Type Manager was licensed from Adobe Systems, Inc. for inclusion in WordPerfect's DOS-, Windows-, Apple Computer, Inc. Macintosh- and Unix-based products.
- Novell, Inc. and WordPerfect are working on a Network Loadable Module for WordPerfect Office. WordPerfect also joined Novell's Technical Support Alliance.

Mary Conti Lofredo, an analyst at Framingham, Mass.-based International Data Corp., said that while WordPerfect's expanded focus on document processing rather than word processing was laudable, whether the company could compete with firms touting integrated software was unclear.

She pointed out that suites of software from Microsoft and Lotus could gain hammerlocks on the market before WordPerfect is able to fight back.

WHAT HAVE BILL GATES, SCOTT MCNEALY, JOHN SCULLEY, JOHN YOUNG AND LARRY ELLISON AGREED TO COOPERATE ON?

NEWS SHORTS

Multilingual GUI tool unveiled

A new tool from Uniface Corp. reportedly lets users write one database application that supports four leading desktop graphical user interfaces (GUI). Uniface's universal presentation interface (UPI) translates source code, based on a single command from the programmer. UPI then generates the object code for the four GUIs. The company also announced Uniface 5.2, an enhanced tool kit with 30% faster database drivers. The product supports a variety of relational database management systems. Pricing starts at $5,000.

IBM, AT&T finally deliver goods

Fulfilling a year-old promise, AT&T and IBM have announced software that enables their respective network management systems — Accumaster Integrator and NetView — to exchange configuration and alert information. AT&T unwrapped Accumaster Integrator Release 3.0 and an enhanced version of its SNA Management Application. IBM introduced Network Carrier Interconnect Manager and Network Carrier Interconnect Agent. Slated to ship this fall, all four products must be implemented in order to support full, bidirectional interaction between NetView and Accumaster. The total cost for the products is $260,000.

AIX cluster software on the way

After months of providing the product on a request-only basis to customers, IBM last week announced September delivery of its AIX High Availability Cluster Multi-Processing/6000 software. The product ties together two RISC System/6000s in a cluster, allowing customers to choose three different levels or modes of high-availability support.

DEC PC sales lead pack

Six months of figures from "PC Market Monitor," a monthly report from Computer Intelligence, a La Jolla, Calif.-based research firm, shows that Digital Equipment Corp. moved up from No. 10 to No. 1 in personal computer sales growth during the past three months. The report surveyed 27,000 corporate buyers from December 1991 through May 1992. However, DEC still has a market share of less than 2%.

CIM olympics scheduled

A group of vendors is planning a Computer Integrated Manufacturing Interoperability Olympics at the 1992 Federal Computer Communications conference in December. Paul Strassmann, director of defense information, had challenged them to develop an open systems environment that supports practical, day-to-day operations across a broad range of workstations and servers.

Award honors Grace Hopper

The Federation of Government Information Processing Councils and National Trade Productions, Inc. are jointly establishing a scholarship program in honor of the late Rear Adm. Grace Hopper. The scholarship will be awarded to government employees who best exemplify the spirit of her contributions to the country and to computer and information systems overall.

Short takes

DEC announced that it gave out $5 million worth of equipment to research, education and hospital groups addressing HIV/acquired immune deficiency syndrome and Alzheimer's disease. . . . Lansing, Mich.-based insurance firm **Jackson National Life Insurance Co.** last week signed an estimated $200 million, 10-year outsourcing pact with **Electronic Data Systems Corp.**, renewing a deal signed in 1985. . . . **Concurrent Computer Corp.** and **FD Consulting** have formed a partnership under which FD Consulting will provide enhanced versions of its Real-time Market Information Platform System and Ticker Processing System on Concurrent's Unix-based hardware.

More news shorts on page 16

Philip Morris hires IS chieftain

Tobacco king taps ex-N.Y. Life CIO Tom Pettibone for newly created post

BY NELL MARGOLIS
CW STAFF

NEW YORK — Former New York Life Insurance Co. and Procter & Gamble Co. Chief Information Officer Thomas Pettibone has turned up at Philip Morris Cos. wearing the newly minted title of vice president of information systems at Philip Morris USA. Pettibone is charged with technology stewardship of Philip Morris' approximately $10 billion domestic tobacco division and cash core.

A 700-person staff and a $100 million budget come with the job. Toward what goals will the new chief turn them?

"It's way too early to tell," Pettibone said last week, still in the middle of negotiations to determine his own line of reportage. "But a lot will have to do with where the whole [tobacco industry] is going."

Rough ridin'

The new Marlboro Man rides in on tough times. Beset by a panoply of pressures — antismoking trends, lawsuits, competitive off-price cigarette brands and the looming possibility that even diehard premier brand smokers are emerging from the recession with newly prudent spending habits — the U.S.-based cigarette market is reportedly falling off 2% to 3% annually.

At market leader Philip Morris USA, President William Campbell recently told *Fortune* that he intends to save some $75 million this year — and to eagle-eye operations with quality-centered, cost-contained models in mind.

Tom Pettibone: *'This is anything but a turnaround situation'*

Neverthless, Pettibone noted, "this is anything but a turnaround situation."

Even in its current decline, the U.S. tobacco market is huge — an estimated $24 billion — and Philip Morris holds the lion's share. The company socked away $4.8 billion in 1991 on revenue of close to $10 billion. And Pettibone inherits a shipshape shop, said consultant Robert Kurimsky, a 14-year Philip Morris IS veteran who retired as director of corporate computing earlier this year.

He described Philip Morris USA IS as "a group of excellent people, with an interesting mix of products and suppliers" in a company that "is an undisputed technology leader."

For example, the client/server architecture that marks the new frontier at so many large firms has been entrenched at Philip Morris for several years, Kurimsky said.

Pettibone's advent marks two firsts for Philip Morris. The several technology heads whose jobs formerly combined to make up an effective "office of the CIO" will now report to him. Also, said a source close to the firm who requested anonymity, Pettibone is the first executive in Philip Morris history to head up the strategically critical domestic tobacco division from New York parent corporate headquarters rather than from Richmond, Va.

Wall Street's DP firm finishes expansion plan

BY JEAN S. BOZMAN
CW STAFF

NEW YORK — A two-year project to split the New York and American Stock Exchanges' mega data center into two pieces will be completed this week, allowing the exchanges to trade a total of 400 million shares a day even if one data center is knocked off-line. The completion will come with the transfer of the last 25 telephone circuits.

The Securities Industry Automation Corp. (SIAC), a $185 million firm that supports transaction processing at both exchanges, decided in 1986 to split its data resources for security reasons. The October 1987 stock market crash — which provoked two 600 million-share days — followed by a series of fires and power outages, reinforced that decision.

Now, SIAC's large computer room in the Wall Street area is linked to the 2-year-old MetroTech office complex in Brooklyn, N.Y., which houses back-office operations for SIAC and several New York banks and brokerage firms.

"Half-and-half, that was the whole philosophy," said SIAC Chief Executive Officer Charles B. McQuade. "We wanted a dual site, wherever we put it. But we jumped on the opportunity of being able to start from scratch in a new building."

The new SIAC space contains 300,000 sq ft of offices and computer rooms. It holds half of SIAC's computer systems — and one copy of all the data.

Logical split

In 1990, SIAC started splitting its computer complex into two "logical" partitions in preparation for putting the computers into two physical locations. It also built the Operations Management System, which portrays both centers as a single complex. The Brooklyn site computers began going into production last June as leased systems were installed here during scheduled upgrades.

More than 300 Tandem Computers, Inc. processors power 15 SIAC systems that handle equities and bonds, along with one IBM Enterprise System/9000 mainframe at each center, and multiple Digital Equipment Corp. and Stratus Computer, Inc. machines at each site.

Industry experts estimate that SIAC incurred onetime capital expenditures of $35 million to cover the cost of customizing the MetroTech facility and obtaining backup power generators. SIAC also spent about $20 million over the last two years in additional operating costs related to the move, experts said.

Fiber-optic links were forged, running under the East River between Manhattan and Brooklyn. Six high-speed T3 links cross the river and contain multiplexed lines that support data speeds ranging from 1.2K bit/sec. to 256K bit/sec. to T1's 1.54M bit/sec., said SIAC Vice President Burton Spiegel, who is in charge of dual site and disaster recovery planning.

Demographics played a role in selecting Brooklyn as the location for the mirror-image data center. "It's only 1 mile away from Wall Street," McQuade said. "Most people who move data centers out of New York have opted for buildings in New Jersey or the suburbs. We tried to stay in the Brooklyn area, where more than half of our staff lives."

SIAC employs 1,200 people. A van service shuttles SIAC employees between the two data centers. There are commuting alternatives, McQuade said: "A lot of people just walk across the Brooklyn Bridge."

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Chairman and CEO
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John Sculley
Chairman and CEO
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Products polished for PC Expo

10-year anniversary show expected to focus on speed-enhancing GUI tools

BY MICHAEL FITZGERALD
CW STAFF

NEW YORK — The city that never sleeps will draw the ire of those standing in the cab line that never ends outside the Jacob Javits Center next week, when some 75,000 attendees at PC Expo find themselves too close to Hell's Kitchen to get a taxi after a long day of kicking personal computer tires.

The show that opened the Javits in 1986, and has since become the nation's second largest computer trade show, is about to mark its 10th anniversary.

In addition to the variety of vendors showing new product lines at the show, attendees this year will see scores of products designed to bring speed to graphical user interface-based software.

Perhaps the most significant announcement at the show will come from Everex Systems, Inc.

The Fremont, Calif.-based vendor will introduce 19 new products, ranging from MaxLogic, a family of mass-market products, to a fault-tolerant version of its StepCube multiprocessing server that will run Novell, Inc.'s SFT Level III fault-reducing version of NetWare, due out late this summer.

Everex will also introduce a version of its Carrier notebook line with both a removable hard drive and a built-in trackball.

A number of companies will introduce more powerful products. For instance, Beaver Computer Corp. is expected to announce a version of its sleek Avanti notebook that employs Cyrix Corp.'s CX486SLC, specifically designed to address the need to improve the performance of Microsoft Corp.'s Windows products.

A slew of graphics accelerators announced this month, many using Weitek Corp.'s W5186 User Interface Controller, will also be there. Other products, such as Cornerstone Technology, Inc.'s ImageAccel display controllers, will also be on display.

Digicom Systems, Inc. will announce SoftModem, a product intended to help improve communications for the fledgling multimedia market.

SoftModem provided software-based modulation and compression algorithms, and when used in tandem with Analog Devices, Inc.'s Signal Computing architecture, it can support audio and video compression and speech recognition. This product may find a home in space-cramped portable computer designs.

More new toys

While major announcements from influential vendors may not be the order of the week at PC Expo, a wide variety of products and deals will nonetheless debut. Among them are the following:

- **AT&T** and **Microsoft** will announce that AT&T's Easylink — AT&T's worldwide electronic-mail system — will support Messaging Application Programming Interface. The two companies will also work to provide a service provider interface to Easylink. They will also discuss a strategic direction for merging the companies' strengths in personal computer software and international telecommunications.
- **Caere Corp.** will announce FaxMaster, an integrated fax/optical character recognition package that allows users to send, receive, character-recognize and compress faxes.
- **NEC Technologies, Inc.** will show an Adobe Systems, Inc., PostScript fax capability for the Silentwriter Model 95 laser printer.
- **Samtron Displays, Inc.** will show off its new line of 17-in. Super VGA-compatible displays.
- Typographic software vendor **Bitstream, Inc.** will announce a new business unit intended to concentrate on the network printing market. **Insight Development Corp.** will also be named as a strategic partner in the market, and Bitstream will distribute Insight's Mosaic network print manager.
- **DeltaPoint, Inc.** will unveil DeltaGraph Professional for Windows, a presentation graphics package.
- **Info Innov, Inc.** will demonstrate Version 2.1 of its Media executive information system for Microsoft Windows 3.0 or higher.

CHRISTOPHER LINDQUIST

CA reverses course with OS/2 2.0 support pledge

BY THOMAS HOFFMAN
CW STAFF

ISLANDIA, N.Y. — Computer Associates International, Inc. will pledge support for IBM's OS/2 2.0 at this week's PC Expo by disclosing its intention to rewrite current Microsoft Corp. Windows applications to the IBM 32-bit operating environment, according to a source close to the company.

The decision would mark a change in direction for the $1.4 billion software firm, which earlier this year said it had no plans to support the operating system.

CA and IBM will announce a joint marketing agreement for at least six of CA's Windows applications, once CA rewrites them for OS/2 2.0, according to the source, who requested anonymity. These products include CA-dBFast, CA-Realizer, CA-Superproject, CA-Compete, CA-Simply Accounting and CA-Unicenter. Representatives for both CA and IBM declined to comment on the planned announcements.

CA officials earlier denied interest in developing applications for OS/2, citing a lack of user interest. That changed in the aftermath of the release of OS/2 2.0. At a recent CA strategy briefing, Sanjay Kumar, senior vice president of planning, said CA users had been pressing the firm to develop applications for OS/2. At that time, Kumar would only say that CA was looking into possible development.

OS/2 2.0 users welcomed the deal between IBM and CA. "I'm glad to see CA jumping on the bandwagon with this," said Keith Seivers, vice president and corporate treasurer of Federal Kemper Insurance Co. in Decatur, Ill.

Federal Kemper, which began beta testing OS/2 2.0 last fall, is currently running applications such as Project Workbench, IBM's Displaywrite and Microsoft's Excel under OS/2 2.0. Seivers said he is also looking to run Windows applications under OS/2.

"That's part of the beauty we see in OS/2," Seivers said. "It allows us to run OS/2 applications under OS/2 and Windows applications under OS/2." Seivers added that Windows "just doesn't have the industrial strength that OS/2 has."

Sources said the six applications would be shipped to users by year's end, with development activities earmarked for the rest of CA's Windows suite taking place during 1993.

Get me rewrite!

CA will rewrite the following five Windows-based applications to run under IBM's OS/2 2.0 operating system by year's end:

- **CA-Realizer** for OS/2 2.0 — A graphical Basic development environment that CA acquired from Within Technologies, Inc. in May. It competes with Microsoft's Visual Basic.
- **CA-dBFast** for OS/2 2.0 — A multiuser, stand-alone dBase/xBase-compatible development language and database.
- **CA-Unicenter** for OS/2 2.0 — An integrated systems management utility comprising systems management, security and storage management capabilities.
- **CA-SuperProject** for OS/2 2.0 — A project management package.
- **CA-Compete** for OS/2 2.0 — A multidimensional management and decision tool that can manage up to 12 business dimensions.

THOMAS HOFFMAN

Lotus swings out Symphony

BY ROSEMARY HAMILTON
CW STAFF

CAMBRIDGE, Mass. — Lotus Development Corp. is planning an official kickoff of an updated version of Symphony within "a couple of weeks," according to Jeffrey Beir, vice president of the spreadsheet division.

Symphony Version 3.0, an integrated office application package, was demonstrated at the LotusWorld conference in Boston earlier this month and will be previewed again this week at PC Expo in New York (see stories this page).

The DOS-based Version 3.0 will offer several user interface improvements as well as new functions for better memory management.

First introduced in 1984, Symphony includes spreadsheet, word processing, database, graphics and communications functions. While the product never gained the widespread popularity of its spreadsheet big brother, it has built up a respectable user base of about 1 million users, according to International Data Corp. (IDC) in Framingham, Mass.

"They've always been sensitive about it," said Bill Higgs, vice president of software research at Computer Intelligence/Infocorp in Santa Clara, Calif. "They think if it weren't from Lotus, it would be considered very successful, but instead it's been in the shadow of 1-2-3."

IDC analyst Mary Conti-Loffredo said Symphony is targeted at the high end of the integrated application market while the real growth is coming from the low end with entry-level packages such as Lotus' Lotusworks.

"In the broader market, the lower end has a much higher shipment volume now," in part because a big chunk of it is going out bundled with personal computers, Conti-Loffredo said.

Impressive improvements

Two beta-test users said they were impressed with the number of improvements in Version 3.0.

"The biggest improvement is its compatibility with text and its text editing," said Jon Gingrich, an actuarial analyst at the Illinois Department of Security in Chicago. "That had been a big problem."

With Version 3.0, Lotus integrated WYSIWYG, a desktop publishing function that was first built into 1-2-3. Current Symphony users rely on a similar function called Allways, which is a separate component that requires users to move back and forth between it and the spreadsheet module.

Gingrich said he made use of the WYSIWYG function recently when preparing financial data on unemployment statistics. "We are currently undergoing negotiations on that front, so we've been spitting out all kinds of scenarios and options," he said.

The new release will cost $695.

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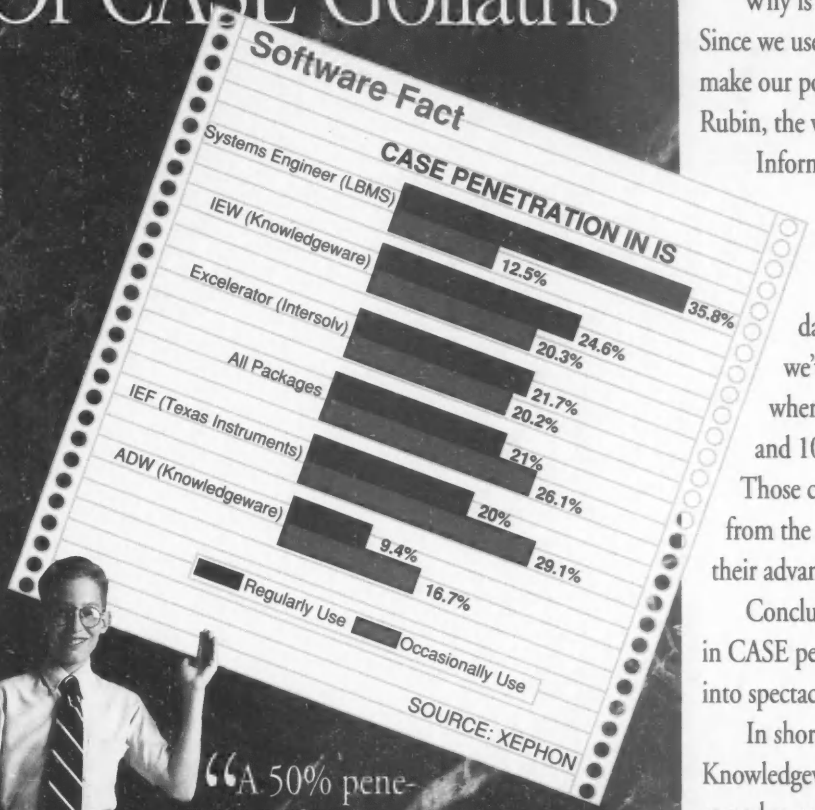

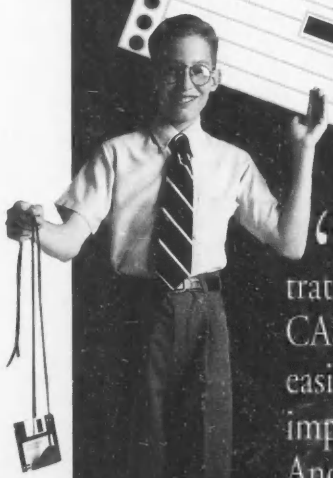

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Hertz mulls outsourcing options

CONTINUED FROM PAGE 1

owned by Ford Motor Co.

According to the source, Hertz is seeking an outsourcer that will help consolidate the company's Unisys Corp., IBM, Digital Equipment Corp., Hewlett-Packard Co. and Tandem Computers, Inc. platforms, with Unisys the likely casualty.

Equally important to Hertz is the reported cash infusion it will receive if it can sell to the outsourcer various assets including the company's reservation system software and its highly regarded yield management software, developed by Decision Focus, Inc. in Mountain View, Calif.

"That's the next general thing to be outsourced in outsourcing deals — the software," observed Howard Anderson, president of The Yankee Group.

Service companies believed to be contending for the job include EDS, IBM's Integrated Systems Solutions Corp. subsidiary, AMR Information Services, Inc. — American Airlines' sister information services company — and Unisys.

Hertz presently runs its reservation software on a Unisys 2200 series platform, and Unisys is pitching an outsourcing deal in an effort to preserve its hardware presence, a source inside Unisys said. Klein declined to comment specifically on the Nolan, Norton report or to discuss motivations other than to say that cost-cutting is driving the company's outsourcing review. A Nolan, Norton spokeswoman would confirm only that Hertz is a client.

The travel industry is one of the most hotly contested among outsourcing vendors, many of which are trying to build comprehensive travel systems by tying together reservation systems from the car rental, airline and hotel businesses.

AMR is part of a consortium of hotels, airlines and car rental companies that is developing a comprehensive travel system. The consortium, called Information Consortium (Intrico), has fallen behind schedule and is not expected to offer products until the end of next year.

EDS recently lost a bid to Perot Systems Corp. for a $500 million outsourcing and distributed computing job with Europcar International in Paris, Europe's largest car rental company.

EDS' strides have included an outsourcing deal with Continental Airlines and an outsourcing/ownership pact with National Car Rental System, Inc. EDS was unable to acquire reservation software in the Continental deal but was successful at that tack in the National contract.

"The reason for any outsourcer in general to add to their travel portfolio would be to give them a chance to leverage off the work they've already done and get synergy," observed Rita Terdiman, program director at Gartner Group, Inc. in Santa Clara, Calif.

Industry analysts observed that Hertz could benefit from a cash infusion to help it overcome the difficult financial times it and other travel industry companies have endured throughout the recession.

Hertz's revenue for the year ending Dec. 31, 1991, was flat at $2.6 billion, and earnings for the year declined, according to a spokesman for the privately held company. He declined to elaborate further.

The company is also facing increasing competition in an already cutthroat industry in which lesser known companies such as Alamo Rent A Car and Dollar Rent A Car are making inroads.

Car wars

If, as they say, outsourcing deals are as much about business politics as they are about technology, then the IS review under way at Hertz is a case in point.

At play in this case is the rivalry between Ford and General Motors, not to mention the spirited battle raging between Hertz and National Car Rental.

Ford owns 49% of Hertz, which is weighing an outsourcing proposal from GM subsidiary EDS. What's more, GM has a significant ownership stake in National, which is already an EDS outsourcing client and which turned over much of its software to EDS.

So does all this rule out EDS at Hertz? "I would think it would not be a reason for Hertz not to go with EDS," said Howard Anderson, president of Boston-based research firm The Yankee Group.

"You could argue it either way," said Stephen McClellan, a Los Angeles-based analyst at Merrill Lynch & Co.

An EDS win at Hertz would potentially combine National's reservation system with Hertz's, a development that could give EDS a formidable technology edge in the travel industry, analysts noted.

MARK HALPER

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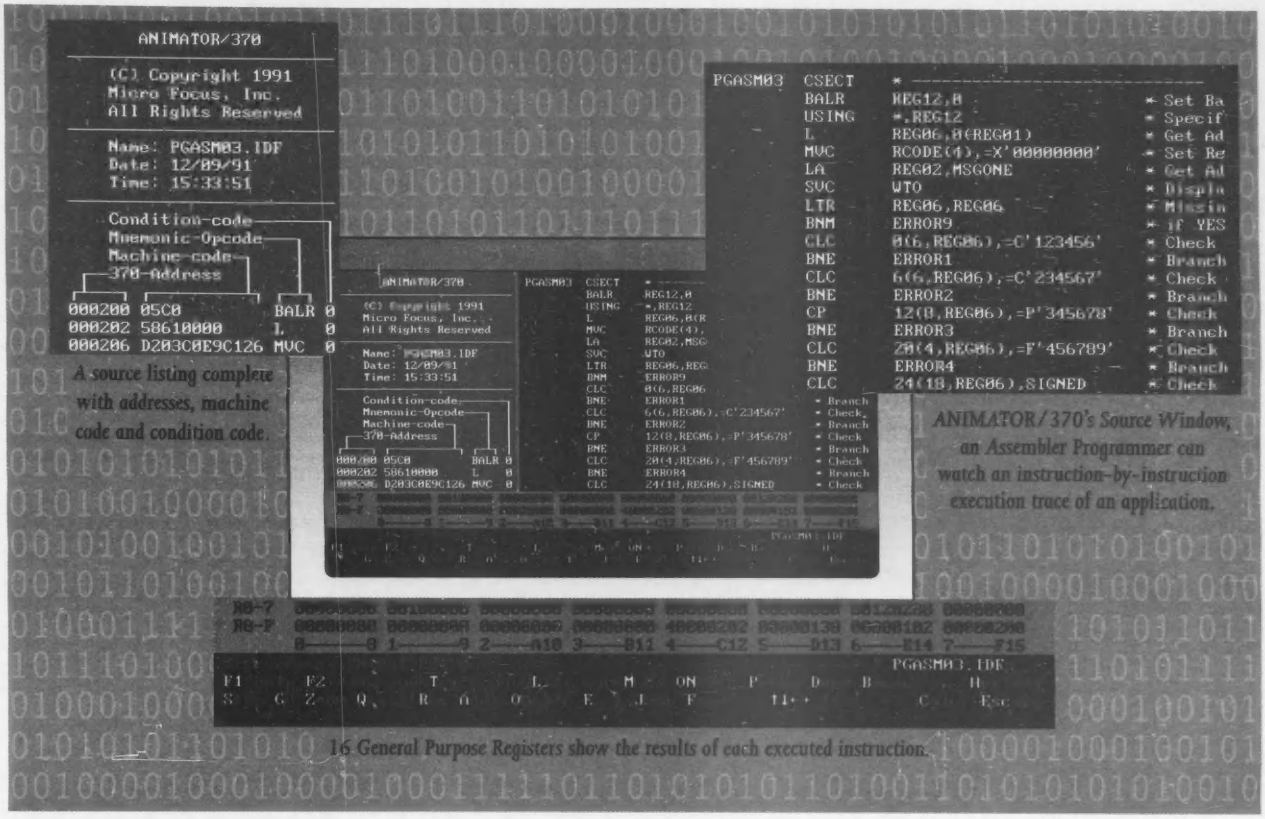

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IBM adds needed zip to TCP/IP strategy

BY ELISABETH HORWITT
CW STAFF

WHITE PLAINS, N.Y. — IBM added some much-needed pizzazz last week to the Transmission Control Protocol/Internet Protocol (TCP/IP) component of its "blueprint strategy" for multiprotocol networking.

With its announcement of TCP/IP Version 2.2 for MVS, IBM addressed a long-standing user complaint that TCP/IP-based communications take up too much processing overhead on an MVS host.

The new software release includes a TCP/IP Offload feature that allows MVS hosts to offload 30% to 50% of TCP/IP processing onto the new 3172 Interconnect Controller Model 3, IBM said.

Delmarva Power & Light Co. in Wilmington, Del., uses the current IBM TCP/IP for MVS in combination with a 3172-compatible McData Corp. 6100 controller to interconnect its Ethernet local-area networks to IBM MVS hosts, said John Scoggin, supervisor of network operations at the power utility.

Scoggin said he was very interested in the CICS-to-TCP/IP Socket Interface provided with the new version of TCP/IP for MVS. "That would let us develop applications [across LAN and host systems] that would otherwise be very difficult to do," he said.

Other features introduced with TCP/IP for MVS Version 2 Release 2 include the following:

- The ability for MVS systems to send TCP/IP packets to other systems via the following connections: Continuously Executing Transfer Interface, RISC System/6000 Parallel Channel Attachment, High-Performance Parallel Interface and channel-to-channel.
- A feature called Network Data Base Client/Server System allows clients to issue SQL queries to an MVS host's DB2 database over TCP/IP.
- Support of the Simple Network Management Protocol for TCP/IP for MVS Version 2 Release 2 and 3172 Model 3.

TCP/IP Version 2 Release 2 for MVS is scheduled to ship Friday. Prices for the basic version range from $20,320 to $70,180, depending on processor group.

IBM's new 3172 Model 3 is said to be a more powerful version of IBM's 3172 family of host gateways for Token Ring, Ethernet and Fiber Distributed Data Interface networks. IBM announced faster communications software for both 3172 Model 3 and the existing Model 2.

The IBM 3172 Interconnect Controller Model 3 is scheduled to ship Sept. 25. Prices range from $21,970 to $63,380.

Affordable IBM Escon

CONTINUED FROM PAGE 1

of information systems at Reynolds Metals Co. in Richmond, Va. "This may cause us to look at it again."

Robert Shaffer, general manager of computer operations at Nynex Corp.'s Telesector Resources Group in Boston, concurred. "We weren't planning to deploy Escon for at least a year. We might revisit that decision now," he said.

Introduced in September 1990, Escon is a fiber-optic-based method of connecting processors, storage devices and other peripherals across much longer distances than what had been available before — 37 miles vs. 4 feet. Escon also provides faster speeds than old copper connections — 17M byte/sec. vs. 4.5M byte/sec.

Until now, however, Escon has been difficult to cost-justify based on the distance and speed advantages alone. Installing Escon requires ripping up the old computer room cables and putting in fiber cables, a process that only made sense if a user was building a new data center.

Now there is more of an economic justification: With the Escon Multiple Image Facility (EMIF) announced last week, users can save significantly by needing fewer channels. A customer that had 16 channels supporting four logical machine partitions will now require only four channels, IBM said.

A logical partition allows customers to divide up one computer into many submachines — one for testing and another for development, for example.

How much a specific customer can save with EMIF will depend on how many logical partitions are in the mainframe, how many machines are in the shop and how many channels are used per partition. Some customers use one channel per partition; others use up to four. EMIF is scheduled to ship in December free of charge to current Escon users and will be a field upgrade.

The EMIF implementation is in the Escon I/O processor, not in the mainframe itself, so performance should not be an issue, according to IBM.

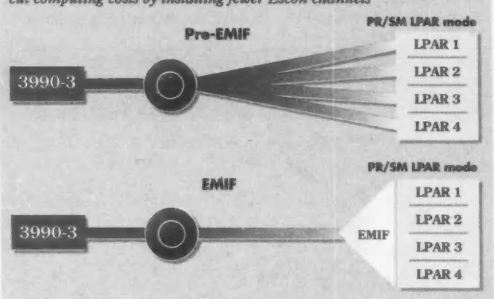
There may be one slight downside. Although IBM maintained that customers can use the saved channels for other purposes — to connect other controllers, for instance — it is unclear what will happen with the 200 current Escon users. "There isn't much of a market for used Escon channels," said Nick Allen, an analyst at Gartner Group, Inc.

The vast majority of the current Escon users are "tactical," Allen said. "Very few have full-blown Escon." Because all the high-end Enterprise System/9000 mainframes automatically ship with Escon channels, it is difficult to track how many customers are actually using Escon, as opposed to merely having the capability.

But it is a critical sell for IBM because "control of the channel and its protocols is the key to controlling the data center and everything communicating with it," said Robert Callery, a senior analyst at Technology Investment Strategies Corp. in Framingham, Mass. IBM is offering incentives to get as many customers to Escon as possible.

Changing channels

Using IBM's Escon Multiple Image Facility (EMIF), customers can cut computing costs by installing fewer Escon channels



For a customer with three regions and 24 channels, the pre-EMIF cost for controllers, ports and channels is $535,000. Converting to Escon actually increases the cost to $631,000 because of the additional gear needed such as Directors. But with the EMIF feature, costs can be reduced to $207,000 because the customer only needs eight channels.

Source: Annex Research & IBM

Something new, something Blue

In addition to the Escon enhancements, IBM last week unveiled new releases of its major mainframe operating systems and said it would stop supporting some old systems software versions.

New MVS/ESA software — Version 4 Release 3 — was called "kind of a yawn," by analyst William Malik at Gartner Group. IBM, however, "responded to software developers' needs" by allowing numerous copies of workstation software to share one address space on the mainframe, he added. This will come in handy with client/server applications in which the mainframe and the workstation need to communicate.

Previously, each workstation application required its own address space when communicating with a mainframe, increasing the complexity of writing such systems.

Among the other highlights announced last week were the following:

- VSE/ESA Version 1 Release 3 has been given new features, such as 31-bit virtual addressing, a new version of CICS for VSE and data spaces. It is slated to be available in March 1993.
- VM/ESA Release 2, which IBM said enhances systems management features, is scheduled to be generally available in December.
- IBM will stop marketing old releases of Job Entry System (JES), including those that ran under MVS/XA. Certain JES2 and JES3 releases will be serviced until March 31, 1994.
- Effective Dec. 31, 1993, IBM will stop supporting old versions of VM, including VM/SP and VM/SP HPO. Service will also be discontinued for VM/ESA Version 1, effective the same date.
- As of Dec. 18, IBM will stop marketing some older versions of VSE, including VSE/SP Version 4. Service for VSE/SP Version 3 will stop Sept. 30, 1993.

JOHANNA AMBROSIO

Banyan eyes E-mail edge

BY ELISABETH HORWITT
CW STAFF

WESTBORO, Mass. — Banyan Systems, Inc. is hoping that the latest version of its electronic messaging system will do for mail-enabled applications what its Vines did for local-area networks: act as a pipeline through which third-party applications and electronic mail can communicate across the enterprise.

Banyan is positioning its Intelligent Messaging system, announced last week, as a server platform for "messaging-enabled applications" such as work-flow management, Banyan Vice President Bill Johnson said. Banyan plans to woo third-party applications suppliers by supporting popular application programming interfaces (API), he said.

Intelligent Messaging will support Vendor Independent Messaging, Novell, Inc.'s Message Handling System and Microsoft Corp.'s Mail API next year, Johnson added.

Direct support planned

The company also plans to incorporate support of the CCITT X.400 and Simple Mail Transfer Protocol E-mail standards directly into Intelligent Messaging at an undisclosed date.

Intelligent Messaging, with its promised open interfaces and more robust traffic management features, could well "provide a broader reach for Banyan E-mail" within Pennsylvania Blue Shield, communications programmer Linda DuRussell said.

DuRussell praised new features such as 4:1 message compression and the product's ability to checkpoint messages going over lines that are prone to disconnect. The checkpoint feature enables the system to begin sending where the transmission left off.

Intelligent Messaging is a "real departure" from Banyan's former, proprietary E-mail strategy, according to David Marshak, a vice president at Patricia Seybold Group, a Boston consulting firm.

Where Banyan previously sold its E-mail applications and E-mail transport system as a package deal, it is now concentrating on selling enterprisewide E-mail services, "and letting others specialize in [E-mail applications] such as work-flow and rules-based mail," Marshak said.

Intelligent Messaging will go head-to-head with products such as Novell's Global Messaging Service and Soft-Switch, Inc.'s Unix-based Enterprise Mail Exchange, Marshak said. The product is scheduled to ship in July and is priced at $1,495.

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Oracle finally unveils distributed database

BY JEAN S. BOZMAN
CW STAFF

NEW YORK — Oracle Corp. finally got it right last week. After a year of delays, it formally introduced Version 7.0 of its relational database management system engine. This version, called Oracle 7, will enable users to build and operate distributed databases when it ships this fall.

By then, users will have their pick between four similar databases, including those from Sybase, Inc., The Ask Cos.' Ingres Products Division and Informix Software, Inc. However, Oracle expects to stand out from the pack by virtue of several automated features that the company said will reduce coding time for users (see story at right).

"We use 60,000 lines of code to manage user access at one federal agency that has 900 sites, and Oracle 7 would reduce that considerably," said Dale Lowery, a consultant and the president of Oracle User Resource, a consortium of Oracle user groups.

To ensure that future generations of its product roll off the assembly line in a timely manner at high-quality levels, the company is partnering with a number of other vendors, including Hewlett-Packard Co. and Sun Microsystems, Inc. HP and Sun ran benchmarks, and HP helped improve Oracle's quality process.

"You'll never see Oracle go it alone again," said Oracle Chief Executive Officer Lawrence Ellison.

Partnering may not be enough to spur growth at the $1 billion company, which has hit a

Oracle's Ellison: *'You'll never see Oracle go it alone again'*

plateau in revenue derived from new software licenses. To overcome this, Oracle is pitching Oracle 7 at new customers that are planning client/server architectures and is pushing consulting services. The company also hopes to grab market share from its competitors.

"One of the themes of the announcement was taking market share away from Sybase," said Tony Percy, vice president at Gartner Group, Inc.'s software management strategies group.

Sybase generates $160 million in revenue, targeting small- to medium-scale RDBMS systems. But Oracle 7's technology is more likely to prevent erosion in Oracle's base, which needed the new functions and features, Percy said, adding: "There are very few companies that are deploying distributed systems on a global wide-area network."

More refined

Four years in the making, the Oracle 7 database has features that were refined and tested with the help of systems vendors and alpha-code users to a much greater degree than previous Oracle releases. That made the beta-test code remarkably bug-free, according to users who have been testing the code since August 1991.

"I really think they know they've got to to make that whole process work," said John Morrell, a senior software analyst at International Data Corp. in Framingham, Mass.

To prevent a repeat of the reliability problems that came with Version 6.0, which debuted in 1989, Oracle put Oracle 7 through a beefed-up testing program.

"We almost doubled the number of people involved in development, compared with Version 6.0," said Derry Kabcenell, a key Oracle 7 architect. "Fifty percent of the increase was in testing." He said 3,000 testing scripts were used in nightly tests at Oracle's Redwood City, Calif., headquarters.

Oracle 7 was designed to allow multiple servers to connect seamlessly, allowing them to exchange data even if they are running on different hardware platforms and on different networks.

"It's creating the illusion that all your data on all your computers is stored on a single database," Ellison said.

Industry analysts said Oracle Version 6.0 users have been able to access multiple servers by using Oracle SQLNet, but they were not able to update multiple files through two-phase commit, which Oracle 6.0 did not support. Analysts said they were convinced that Oracle 7 is well-designed and includes a well-integrated set of features, even though it has not been beta-tested in production [CW, June 15].

Oracle 7 is set to be shipped along with the new SQLNet 2.0 networking software and a set of software tools. The product's procedural option, distributed option and parallel server option will be priced 20% above the base price of the user's Oracle 7 database license. If a user paid $100,000 for a software license, the procedural option would cost an additional $20,000, for example.

"The only thing I would hope is that the pricing stays simple," said Michael Abbey, chairman of the Affinity user group council.

Users also appear to be confident of Oracle 7's enhancements. "Our biggest concern is when it's going to be shipped," said Tom Zielinski, chief information officer at Kenny Services, a subsidiary of Standard & Poor's Corp., an alpha-test site.

Oracle 7 in detail

Oracle 7 offers the following key features:

- **Multithreaded server.** Previous versions of the Oracle database were single-threaded, creating multiple Oracle "processes" as users logged on, one for each user. The multithreaded server will allocate users to shared system resources more efficiently.
- **Automatic two-phase commit.** Preprogrammed instructions reduce the need to custom-program transaction updates among distributed databases.
- **Declarative referential integrity.** Database administrators can keep data consistent throughout the RDBMS by placing rules, including primary and foreign keys, inside rows and columns of database tables.
- **Cost-based optimizer.** Statistics about the distribution of data throughout the RDBMS are used to determine the most efficient data-access path for SQL queries.
- **Security roles.** Database administrators can now assign security clearance to user workgroups, then assign individual users to those user groups.

Desktop Unix brings USL, OSF closer

BY MARYFRAN JOHNSON
CW STAFF

SAN FRANCISCO — A very public peacemaking between once-warring Unix camps may have stolen the spotlight here last week when Unix Systems Laboratories, Inc. (USL) finally unveiled Unix System V 4.2.

While users said they were interested to hear details about the streamlined desktop version of the venerable System V Unix — which is scheduled to ship in late fall — the real show-stopper was the peace treaty declared between USL and the Open Software Foundation (OSF).

"We are very positive about the fact that USL and OSF are working together," said Harriet Schabes, a vice president at New York-based Citibank NA's technology office. "Obviously, we'd like to see as much portability, interoperability and common interfaces as possible."

OSF President David Tory stood at USL President Roel Pieper's side and voiced his "delight" over the growing relationship between the two rivals. Friendlier relations have blossomed since USL recently said that it will offer products based on the OSF's Distributed Computing Environment and Distributed Management Environment technologies.

"I'm very pleased to be here to support the very pragmatic role USL is taking in driving Unix forward," said Tory, who never mentioned his own OSF/1 operating system. "Our ultimate goal is application-level interoperability, although there is a lot of work to do before we get there."

In what Pieper described as the "Destiny program" for 4.2, USL plans to stake a claim in client/server computing by doing the following:

- Supplying both source code and binary code versions of 4.2 to USL's vendor customers, who will build on that base product to produce a wide variety of Unix offerings.

Already signed on as OEMs for 4.2 are Unisys Corp., Ing. C. Olivetti & Co., NEC Corp., ICL and Wyse Technology, Inc.

According to Unix International, Inc., 4.2 should run an estimated 6,000 current applications without modification, primarily those written for Unix System V 3.0, The Santa Cruz Operation's SCO Unix and Xenix.

- Ramping up volume distribution of 4.2 through Univel, the USL/Novell, Inc. joint venture, which will bundle 4.2 and NetWare into a product called Unixware.
- Creating an on-line information and support network — a kind of "yellow pages" for Unix System V hardware and software — through another joint venture with USL, Fujitsu Networks Industry and Tangent International Computer Consultants. This "UniLinx" service will be on-line early next year, Pieper said.

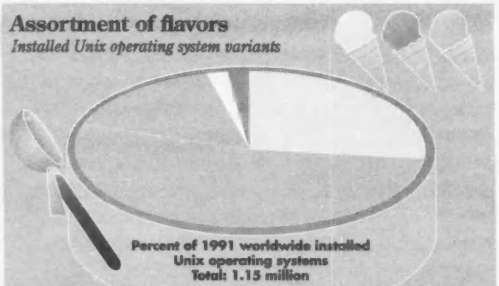
"An electronic on-line market is a really good idea," said Sally Atkins, a consultant in technology, research and planning at John Hancock Mutual Life Insurance Co. in Boston.

At Federal Express Corp. in Memphis, the heterogeneous computing environment there will welcome the chance to try out a low-end desktop Unix, said Jon Ricker, vice president of corporate systems development. "I think this Destiny product is absolutely a superb effort in finally pulling this thing through the hoop," Ricker said. "It's something [the Unix industry] needs to do with things like Windows NT on the horizon."

The competitive threat of Microsoft Corp.'s Windows New Technology, also due out late this year, has been a galvanizing force for Unix vendors, industry analysts agreed. "Both USL and OSF have recognized that all the warring has done is fragmented the marketplace and kept people from buying Unix," said Rikki Kirzner, an analyst at Dataquest, Inc. in San Jose, Calif.

Assortment of flavors

Installed Unix operating system variants



Proprietary Unix
Includes all Unix variants running on one manufacturer's hardware, such as IBM AIX, DEC Ultrix, Apple AUX or HP/UX — **27%**

Multivendor Unix
Unix System V — **53%**
SCO Unix — **16%**
Unix BSD 4.X — **2%**
Mach Unix — **2%**

Source: Computer Intelligence/Infocorp

Missing tools won't delay client/server

CONTINUED FROM PAGE 1

cost reduction. This represents a 55% drop in processing costs, Kettleson explained.

However, he noted that British Petroleum has retained only about 10% of the development staff that it had three years ago and has outsourced much of its programming to deal with the lack of available expertise.

Kettleson, along with the majority of technology planners at the session, expressed a decided preference to buy off-the-shelf tools and applications rather than develop them in-house. To counter the gap in available products, British Petroleum has partnered with several oil companies, including Texaco Corp., Chevron Corp. and Statoil, and computer vendors to deliver application programming interfaces and data models to allow third-party developers to create industry-specific applications that will interoperate, he said.

Outside help

Third-party assistance will be a must for most firms making the transition from centralized to distributed approaches, users said. "I agree there is a big need for outside help," said Richard Lessard, senior vice president of applications development in the Global Cash Management Services group at Citicorp in Tampa, Fla. "I don't know how most companies are going to successfully handle the training issues. The challenge is to decide realistically who is retrainable and [let those who aren't] stay around awhile to maintain the old Cobol systems."

Open systems pioneer Kash n' Karry Food Stores, also in Tampa, "lost quite a few" of its programmers when it started staffing for its five-year distributed computing overhaul in January 1991, largely because "people couldn't make the jump" to object-oriented programming, said Dennis W. Read, information engineer at the $1 billion company. Kash n' Karry bypassed computer-aided software engineering technology and plunged directly into object-oriented work to leapfrog its competition, he said.

"We can't find people with the right expertise on their resumes, so we're looking for an aptitude and an eagerness to learn," Read said. He added that the firm is committing about 10% of each programmer's salary to retraining, and the company's chief executive officer has sanctioned "a good six months" of pure experimentation with C++ and other object-oriented technologies to allow staff members to become proficient.

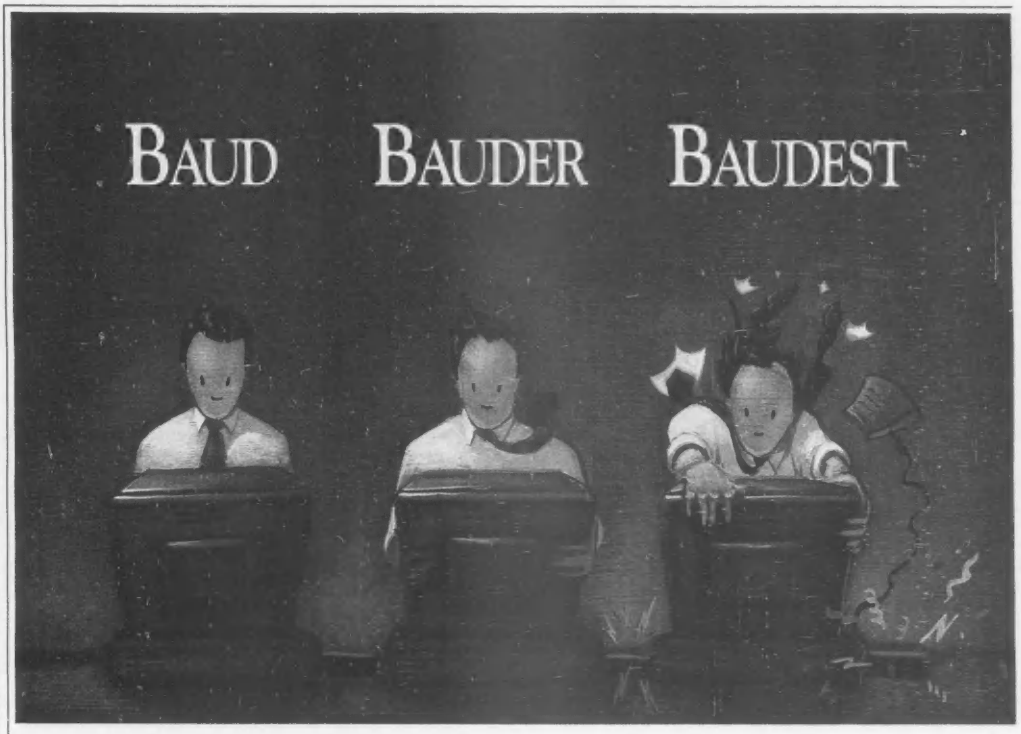
Like British Petroleum and other organizations, Kash n' Karry "had no desire to write development tools" but was forced to do so in order to remain vendor-independent, a primary corporate information systems goal, Read said.

Cedric S. Bennett, director of the application support center at Stanford University's data center in Palo Alto, Calif., said he is also facing an absence of high-level, cross-platform development tools to support application development across Apple Computer, Inc.'s Macintosh operating system, Microsoft Corp.'s Windows and Unix clients.

Michael Millikin, a principal at Gunstock Hill Associates, who co-chaired the session, said there is a 24-month average backlog of applications within organizations, and it is getting to the point that business needs have often changed by the time applications become available.

Users also pointed out that it is difficult to predict upfront the cost of implementing a distributed computing infrastructure. For example, Kash n' Karry's $6 million IS budget unexpectedly increased by 22% in the project's first year, in part because of the redundant costs associated with continuing to run legacy systems, Read said.

However, Read said he expects costs to return to original levels by the third year when the firm eliminates DB2 and several large storage devices.



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NEWS SHORTS

American Airlines inks PC pacts

American Airlines last week signed major personal computer contracts with IBM, Tandy Corp. and Grid Systems Corp. The IBM pact is a multiyear agreement to sell Personal System/2 Models 57 SLC, 90 and 95 to travel agents on its Sabre system and for use by company employees. Grid and Tandy boxes include the MFP/450 and APT/450, both 80486-based machines. They are slated to be used at American ticket counters and gates.

Kendall Square goes commercial

Kendall Square Research Corp. in Waltham, Mass., will pitch its parallel processing computer to the commercial market in 1993. By the fourth quarter of this year, the company hopes to be working "closely" with two or three commercial accounts, with the major push next year. The company has also proven, on paper for now, that its KSR1 computer can incorporate its 1088 processors.

Tandem to debut imaging tool

Tandem Computers, Inc. will announce a new image processing server at this week's Association for Information and Image Management show in Anaheim, Calif. Tandem created the system by adding data management software from Epoch Systems, Inc. in Westboro, Mass., to magnetic disk drives and optical discs. The Tandem Image Storage Server is available immediately, and it is priced from $103,400 for a system that supports 465,000 images to $333,400 for a system that supports 6.6 million images.

User groups forming

New York-based Uninterruptible Uptime Users Group is looking to go national. It focuses on continuous availability for all information systems aspects, from infrastructure to data centers and end-user workstations. People interested in establishing local chapters can contact Chip Ralston, membership chairman, at (215) 569-5913. Separately, an independent group of 21 Sequoia Systems, Inc. customers has formed the Sug/gest user group. DeMarquis Walls, vice president of IS and technology at Damark International, is president of Sug/gest.

Wang wins pricing lawsuit

A Massachusetts federal district judge last week gave Wang Laboratories, Inc. the go-ahead on a pricing policy announced in April 1991 that was promptly frozen after an antitrust suit was filed in protest. Wang will now charge between $1,000 and $1 million for operating system software licenses on used VS computers; fees vary according to system size. Under the old system, folks who bought VS models on the aftermarket could get their operating system software for a flat fee of $1,000.

Short takes

Intel Corp. joined the ranks of 3.3V chip vendors last week, releasing its 3.3V 80386SL chip. Intel will make both a cached 20-MHz version and cacheless 16- and 20-MHz versions of the chip. . . . **Ungermann-Bass, Inc.** and **Protools, Inc.** have delivered on plans to integrate Protools' Foundation Manager local-area network monitoring system with UB's NetDirector hub management system. . . . The **U.S. Air Force Academy** will buy 1,275 multimedia systems from **CompuAdd Computer Corp.** The deal, which centers on Intel 80386SX-based systems with proprietary TV/video adapter cards, will earn CompuAdd $2.2 million. . . . **NEC Corp.** will license a variety of **Communication Intelligence Corp.**'s pen software, including its PenDOS operating environment, multilingual Handwriting Recognition Systems and Dynamic Signature Verification System. . . . **IBM** will step up **OS/2** marketing efforts with a "superstore blitz" and TV advertising. IBM volunteers will hit various retail outlets to promote and demonstrate OS/2 2.0. . . . **Dell Computer Corp.** has doubled the number of shares of stock it will sell to the public. . . **Digital Equipment Corp.** appointed William Steul to fill the slot of vice president and chief financial officer.

Wang imaging for AIX arrives

But will Open/image rise above the other RS/6000 implementations?

BY ELLIS BOOKER
CW STAFF

ANAHEIM, Calif. — Fulfilling a year's worth of user expectations, Wang Laboratories, Inc. this week is expected to introduce an imaging system for the RISC System/6000, IBM's Unix-based server.

Analysts described the product as a critical peg in Wang's imaging strategy, as well as the company's broader Office 2000 office automation initiative.

"I think the most salient point is that Wang has been very closely tied to its [proprietary] VS image server . . . and most businesses don't want to invest in the VS," said Ajit Kapoor, vice president and director of Image Management Strategies at Meta Group, Inc. in Westport, Conn.

VS customers can run the RS/6000 as an application server — retaining their VS as an image server — or use the VS for applications and the reduced instruction set computing (RISC) platform as the image server.

Alternatively, they can migrate hardware peripherals and software applications entirely to the RISC platform.

But for Roger Sullivan, vice president of systems at BIS Strategic Decisions in Norwell, Mass., Wang must prove the advantages of its implementation against the growing number of vendors with RS/6000 implementations. "We think the RS/6000 will be the hot box at AIIM and beyond," said Sullivan, referring to the Association for Information and Image Management show held here this week.

Setting itself apart

Wang officials, meanwhile, touted the superiority of their Open/image architecture, which uses a common set of application programming interfaces (API), as a way of differentiating their own AIX implementation from the pack. "Our application-enabling approach makes us available on a wide range of application platforms," said Dave Goulden, vice president of marketing.

Wang will also show off no fewer than 17 third-party applications, including work-flow solutions from four vendors.

The value of Wang's API third-party strategy, however, may not jibe with the needs of some big accounts, which want tighter integration between existing applications and an imaging system than APIs provide.

That is the thinking at Shearson Lehman Brothers, Inc. in New York, which has been beta-testing Wang's Open/image Server for NetWare since last year and now has it in 10% of its 400 branch offices.

While Mino Akhtar, vice president of technical planning, applauded Wang for allowing customers to mix and match third-party products, she said a tightly integrated work-flow tool was necessary for her plans to build enterprisewide systems.

Akhtar, in fact, said she plans to use an imaging system from Santa Clara, Calif.-based Plexus Software, Inc. as the basis for what Shearson calls its "centralized image utility."

This distributed, Unix-based system will accept image data from departmental imaging systems from a variety of vendors including Wang, she said.

Shearson's image utility, scheduled to be deployed at year's end, will use the Hewlett-Packard Co. Unix platform.

Wang's Open/image for AIX will be available in September. The image API software is priced from $1,700 to $27,400 for each RISC system. The image server software costs $32,500 to $103,000 for each RISC system.

Image workstation software is priced at $1,600 for each client personal computer.

Humana tries to swallow Unix-based imaging pill

CONTINUED FROM PAGE 1

30% improvement in [claims] adjuster productivity, along with a 10% productivity improvement in customer service," said Joe Mudd, manager of claims systems development.

However, the imaging system will "not result in staff reductions, although some individuals' jobs will change," said Bruce McClure, Humana's director of claims/finance and administration.

While agreeing that the system will be cost-effective, McClure noted that one of the biggest benefits will be improved customer service.

Under the old manual system, McClure said, customers might have to wait several days after inquiring about a claim to get an answer. "With this system, accessing that claim will be in a matter of seconds," he said.

Improving its claims operations took on special meaning last week when Humana warned investors that results from the third quarter and fiscal year — which ends Aug. 31 — will be below last year's $355 million on revenue of $5.87 billion for fiscal 1991. At the same time, a congressional committee is investigating Humana for an alleged $21 million in Medicare overcharges last year.

For New York Image Business Systems, the Humana project comes at a critical moment.

Once the sole supplier of an RS/6000-based imaging solution, 4-year-old Image Business Systems has suffered from product delays, financial woes and a management shake-up. Now it faces a growing number of major competitors that have recently added RS/6000 implementations to their product catalogs.

Earlier this year, for example, Filenet Corp. said it would migrate to RS/6000 servers, and this week Wang Laboratories, Inc. will make good on its year-old promise to put the RS/6000 at the center of its Open/image line (see story above).

Humana, a large IBM 3090 shop, opted for Image Business Systems' RS/6000 server rather than a mainframe version of IBM's ImagePlus.

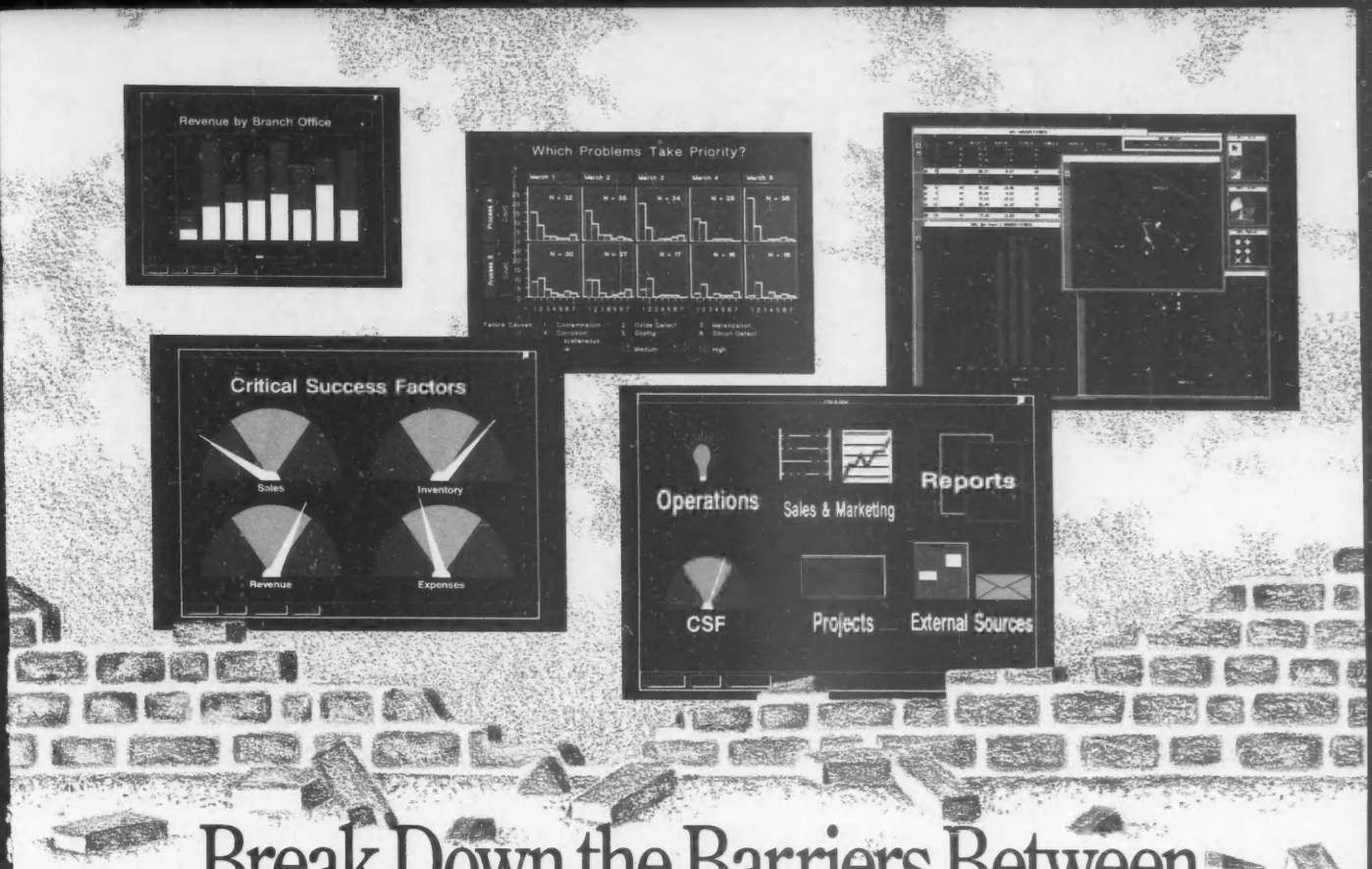
"We have multiple 3090s, all at capacity, and so a mainframe solution was an option for us," said Glenn Sewell, Humana's director of systems. But at the time, IBM's ImagePlus for MVS did not have the features available on the Image Business Systems platform, he said.

Image Business Systems' RS/6000 solution also proved it would scale to meet Humana's expanding needs, a critical requirement, Sewell said.

With Humana's more than 1.7 million members, the volume of paper coming into each of its three claims offices is enormous: Every day the Louisville center receives 16,000 claims.

The scalability of the system from Image Business Systems was successfully tested last year when a single RS/6000 supporting 25 workstations was scaled to five servers supporting 600 users "without touching the code," Sewell said.

Humana's plan calls for each of its claims processing centers to have at least two Token Ring local-area networks connecting the PS/2 and the image servers. On the desktops, workers who used 3270-type terminals will get Model 70 workstations featuring 19-in. color monitors.



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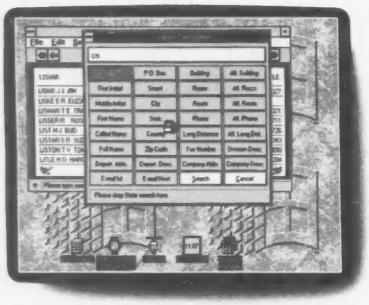
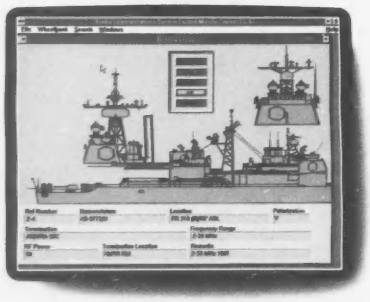


CHEVRON

Chevron's LAN system clients asked for a PC-based corporate directory to give PC users a "phonebook" similar to the one on their mainframe. The problem was there was no solution on the market that could accommodate 45,000 records with 30 fields each. To solve their problem, they used Visual Basic,™ MicroHelp Muscle for Visual Basic, VBTools, EditTool, ButtonTool, and Ramia Data Manager to create CLSctn for Windows. Now the users have an easy-to-use directory that allows them to access information by several different indexes.



U.S. NAVY

Navy ships were drowning in paper. The Chief of Naval Operations has estimated that it was costing $400 million per year to store, access, control and update the vast amounts of required technical information. Using Microsoft C, the Windows SDK, Microsoft Word for Windows and Excel, they developed the Interactive Electronic Technical Manual. It allows them to store all of the volumes of technical information on a CD-ROM, which can be accessed with the click of a mouse.

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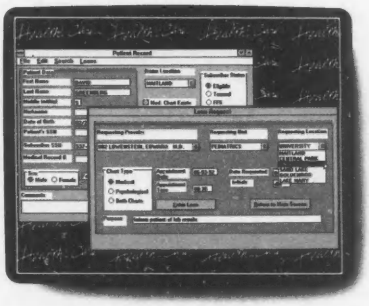
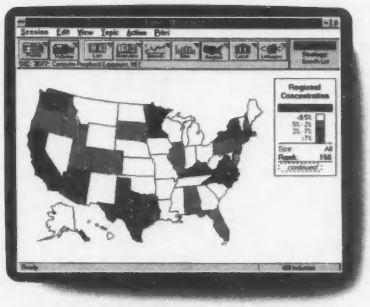


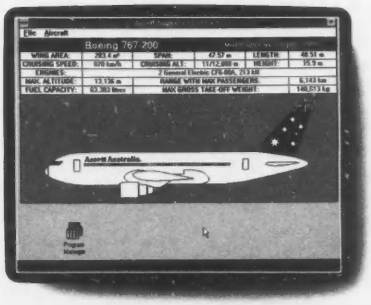
Orlando Health Care Group

Orlando Health Care is a 52-physician practice providing HMO services at 6 medical facilities. They had a problem tracking and updating over 100,000 medical charts, because patients can receive services at any of the facilities. So they used Microsoft Visual Basic, Q+E™ Database Library, Microsoft SQL Server, Microsoft LAN Manager, and Select Comm Server to create the Master Patient Index, a systemwide database. The new system saves time and helps the company provide better quality health care.



PHH Fantus

As an economic development consulting company, PHH Fantus analyzes enormous amounts of data. Some of their studies require the analysis of over 450 industries, and with the old manual system, it could take over 200 man-hours. To make their operation more efficient, they used Microsoft C, the Windows SDK and db VISTAIII Database Management system to design "Forté," a giant repository for data on a network server which is continually maintained and updated. Analysis that once took weeks now takes just hours.



Ansett Australia

As an airline, Ansett Australia needed to provide a better information system for its users. The old system forced users to wade through a large printed book for flight information. To solve this problem, they created the Ansett Travel Planner, with Microsoft Visual Basic, Windows SDK, Microsoft BASIC Professional Development System. Now it's much easier to update and access flight information. And there's a database that can store travel preferences for customers.

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A long strange trip for IS evolution

The operations at Wal-Mart show the extent to which computing has affected work and play

BY MITCH BETTS
CW STAFF

WALDORF, Md. — A visit to the Wal-Mart store here in small-town America may be the best way to see how information systems have changed American business and society over the last 25 years.

Inside the store you will see the bar-coded merchandise and registers that authorize credit-card purchases in seconds. Outside stands a satellite dish providing real-time voice, data and video connections to Wal-Mart Stores, Inc. facilities nationwide. Except for the bar codes, none of this was possible in 1967.

Meanwhile, in-store computers monitor the daily sales and transmit the data to 17 Wal-Mart distribution centers. This just-in-time inventory management system and electronic links with suppliers have made Wal-Mart the nation's largest and most profitable retailer.

That IS is such a critical element of Wal-Mart's business shows just how far the IS function has come in the last quarter-century.

"In the 1960s, the goal was to take a process like accounting and computerize it to save money. Now, the goal is use information technology to reorganize the way the company operates," said Andrew B. Whinston, director of the Center for Information Systems Management at the University of Texas in Austin.

Along the way, the IS function has undergone a series of transformations as it has moved from back-office data processing to serving the executive suite.

That transition appears in the training of many IS professionals. Once almost solidly grounded in computer science degrees, many IS managers today come at technology from business and liberal arts backgrounds.

Meanwhile, the on-again, off-again relationship between IS and the user community has virtually come full circle. IS started off as the data overlord, a role it held in the early 1980s, only to become shunned as users eager for personal computer freedoms did end runs around the glass house. Today, IS has evolved into more of a partner.

Trends such as cutting backlogs, boosting programmer productivity, turning data into information for decision-makers and integrating islands of automation came and went.

Getting ahead

One turning point came in the mid-1980s, when blockbuster technology applications such as American Airlines' Sabre reservation system gave IS managers grand visions of providing big competitive advantages.

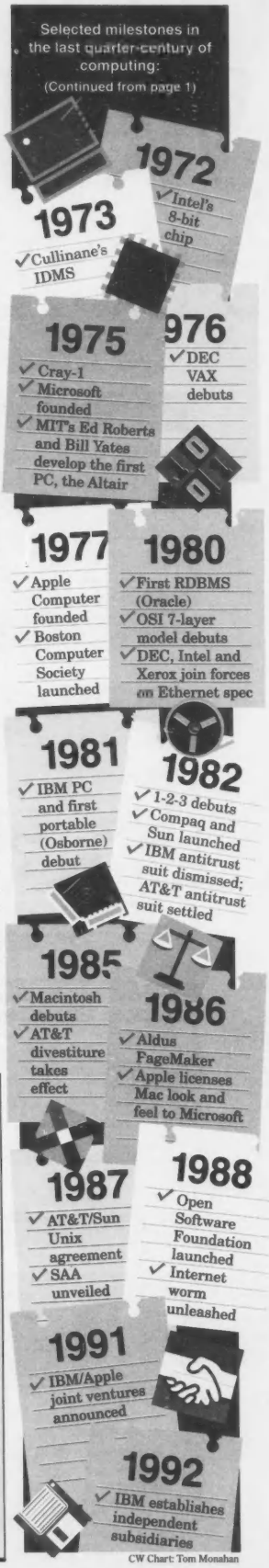
The Sabre phenomenon succeeded in raising the profile of the IS function in the executive ranks and led to the appointment of high-level chief information officers. But the unfulfilled hype and the difficulty of measuring the return on multimillion-dollar investments have resulted in high CIO turnover rates. Some exasperated companies have simply turned IS operations over to outsourcers in hopes of finding some cost savings.

Today, IS is more oriented toward bottom-line results: better alignment of IS and corporate goals and re-engineering inefficient business processes.

Even as IS departments reorder their priorities, economists are puzzled about why the huge investments in information technology over the last 25 years have not boosted the nation's productivity rate.

The myth about the paperless office, for example, has been debunked. Electronic data interchange is a true paper-killer, but most computers are hooked up to printers, and desktop publishing has produced a flood of amateur newsletters.

In the past 25 years, we have also learned the painful lessons that computers "go down" at the worst times — high-capacity fiber cables get sliced by backhoes and software bugs while viruses and worms can cripple systems that we now depend on.



CW Chart: Tom Monahan

Observers search horizon for full impact of desktop

BY MICHAEL FITZGERALD
CW STAFF

The concept of "a PC on every desk" has gone from being a gleam in the bespectacled eyes of a young Bill Gates to a near campaign promise by H. Ross Perot. Personal computing is among the most significant information technology developments and offers the brightest potential for the future. Yet its real impact may not be felt until the next millennium.

"We're just getting PCs on everybody's desk," said Esther Dyson, editor of "Release 1.0," a New York-based newsletter. "Fundamentally, the revolution will come in the next 25 years."

Worldwide, $166 billion was spent on microsystems — including software and peripherals — in 1991 alone, according to Infocorp in Santa Clara, Calif. That outstrips the $164.5 billion for mainframes and minicomputers.

But while some observers said productivity gains have been slow in coming, others maintained the personal computer's benefits have eluded clear measurement.

Industry observers dismissed claims that desktop computers cost more than they are worth."The [PC] is so fundamental to the economy — for better or worse, it's an absolutely fundamental part of our daily lives," said Richard Shaffer, publisher of "ComputerLetter," a New York-based newsletter.

"I don't buy that it hasn't increased productivity," said Frank Gaudette, executive vice president of operations at Microsoft Corp. "In so many areas things are so much richer — there's more creativity in a spreadsheet than there used to be in a three-year plan at some companies in the '60s."

Despite the entrenched view that the PC has liberated end users, making them more effective by increasing their access to information, corporate information systems departments have felt its reach the most — and have been scarred by it.

"The IS department has lost tight control of corporate information . . . and is now struggling to bring some order to it," said Dave House, senior vice president of corporate strategy at Intel Corp.

"The PC [has created a] problem: How should IS be structured to promote overall corporate goals?" said Aaron Goldberg, an analyst at International Data Corp. "How would accounting feel if three or four different departments took Accounting 101 and decided they could do accounting? Yet significant numbers of end users decided that because they could run 1-2-3 they [were] experts."

"I believe the PC revolution is part of a fundamental human desire to control your own destiny," said G. Glenn Henry, a former IBM Fellow who spent 21 years at IBM and led development of the System/38.

Roses and thorns

"Twenty-four years ago, I sat down at a computer for the first time."

— Bill Gates

The last quarter of a century experienced a relentless forward march in computing advances, many too numerous to elaborate on here. But *Computerworld*'s chosen Top 25 innovators (see supplement) recently filled us in on what they see as the most important of these milestones as well as what will be key in the future. Top citations included the following:

- Interactive conversational computing via time-sharing, a forerunner of electronic mail and electronic data interchange.
- Movement to standards and openness.
- Ethernet and the first local-area network cards, which brought cheap networking to the desktop.
- The first PCs, which helped to demystify computing, and the first spreadsheet, Visicalc, which proved PCs could be useful.
- Wiring the country with fiber optics.

Looking down the road, we are told to expect a world in which computers are ubiquitous — interoperating, integrated and built into nearly everything. Many observers also predicted an industry populated by fewer, but bigger firms.

However, the following problems will have to be addressed first:

- Measuring and improving productivity gains.
- Improving development tools so mission-critical applications can be written quickly and reliably.
- Resolving remaining standards issues so investments can be made into future computing infrastructure, such as a national data highway.
- Pushing forward with concepts such as Open Systems Interconnect and Integrated Services Digital Network.
- Nurturing industry "seed corn."

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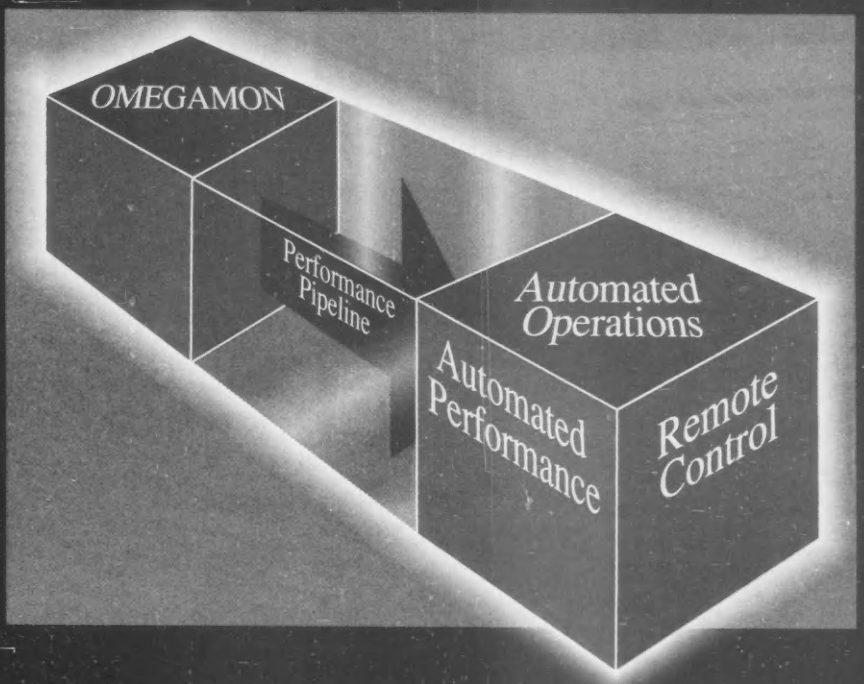

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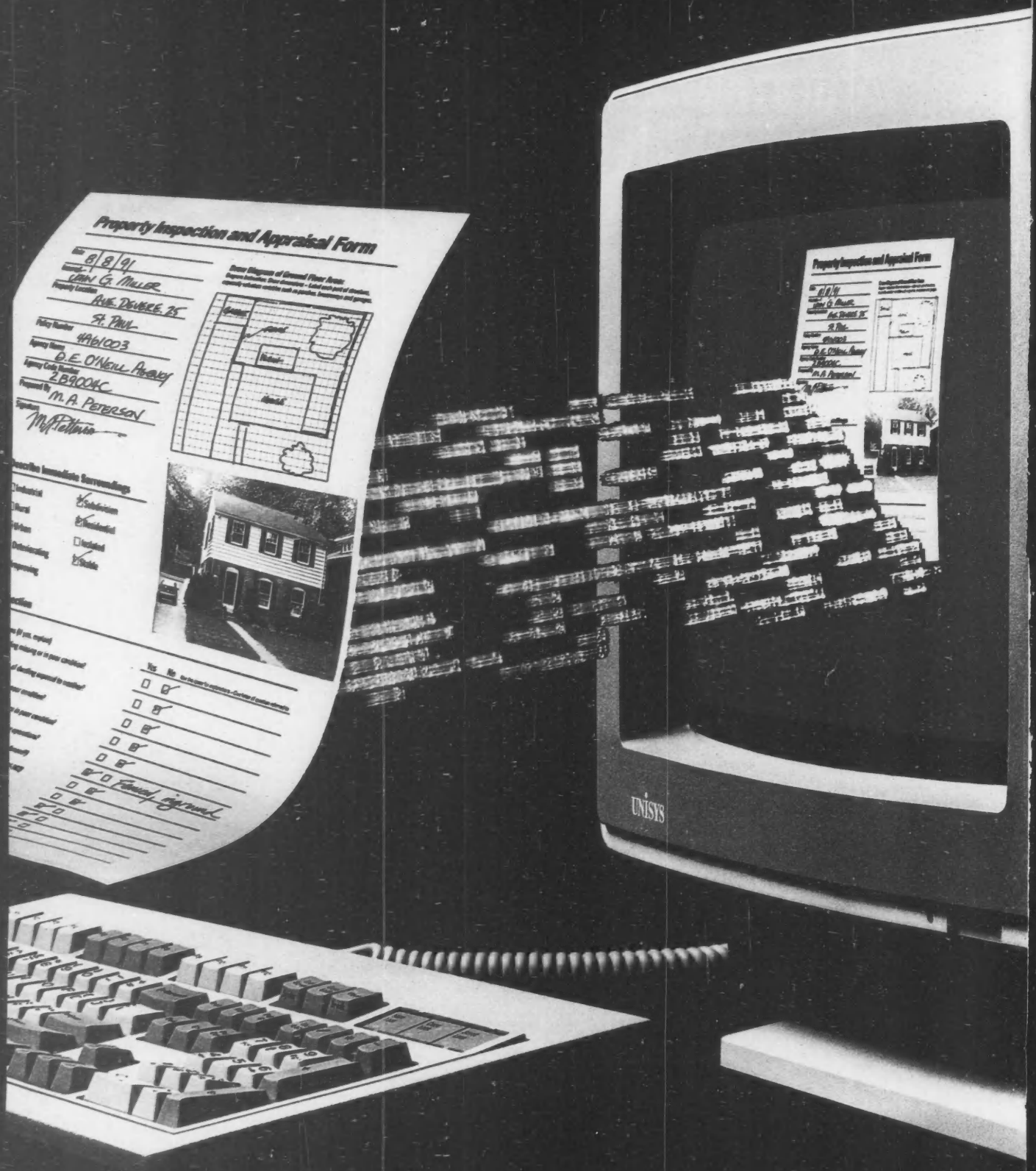
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HP to offer ISDN adapters for workstations, PCs

BY ELISABETH HORWITT
CW STAFF

CUPERTINO, Calif. — A month after Sun Microsystems, Inc. announced its SPARCstation 10 with a built-in Integrated Services Digital Network (ISDN) adapter, Hewlett-Packard Co. last week announced ISDN interfaces for DOS personal computers and the HP Apollo 9000 Series 700 workstations. HP also announced the HP ISDN Server, which is said to support LAN-to-LAN communications based on the Transmission Control Protocol/Internet Protocol.

Though there has not been a recent spike in user demand for ISDN specifically, demand is definitely burgeoning for the on-demand, high-speed connections that ISDN supports, said Rick Malone, a principal at Vertical Systems Group, a Dedham, Mass., research firm. Users do not care whether they use ISDN or a carrier's proprietary inverse multiplexing service, as long as they can call up one or more 64K bit/sec. channels on demand to support LAN-to-LAN and remote workstation-to-LAN connections, Malone said.

McDonald's Corp. has been using Illinois Bell's ISDN Centrex service at its Oak Brook, Ill., headquarters for several years. The company has long considered expanding its ISDN network to remote sites but was discouraged by the sparseness of ISDN services and the lack of interoperability among different carriers' ISDN networks, according to Patrick Krause, director of systems at the fast-food chain.

Now McDonald's thinks the time is ripe to start looking at ISDN products such as HP's, as the basis for remote ISDN links for traveling users, as well as remote local-area networks, Krause said. "We hear that within the next 24 months, anywhere from 50% to 80% of all access lines will have ISDN capability. That will be very useful to us."

Wide menu

HP's ISDN announcements included the following:

- The HP ISDN Link/S700, an add-on card for HP Apollo 9000 Series 720, 730 and 750 workstations, supports up to two 64K bit/sec. ISDN B channels. The product is priced at $2,750, including software.
- The HP ISDN Link/MS-DOS add-on card ($2,590) supports one 64K bit/sec. ISDN link on HP Vectra PCs running DOS. It allows remote, stand-alone PCs to access a LAN over an ISDN link.
- The HP ISDN Server acts as a gateway allowing systems running TCP/IP on an Ethernet LAN to access remote LANs and PCs over an ISDN link. The product is priced at $18,375.

All three products are scheduled to ship July 1.

Intel wins battle in AMD litigation

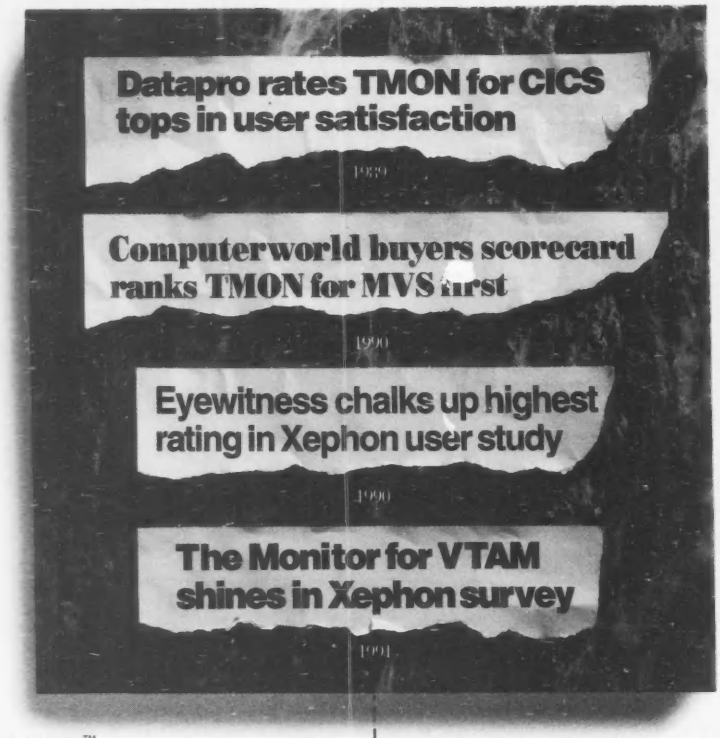
SAN JOSE, Calif. — Intel Corp. drew blood in its court duel with Advanced Micro Devices, Inc. (AMD), when a jury ruled last week that AMD had failed to prove its right to use Intel's microcode in a math coprocessor.

The decision means AMD will have to rewrite the code in its AMDOC287 math coprocessor. AMD officials acknowledged the ruling as a setback, at least because the company will now have to rewrite the microcode for its upcoming 486 clones, delaying this family of chips for at least a quarter.

While F. Thomas Dunlap, Intel's general counsel, called the decision a major victory for Intel, observers said the decision was not likely to affect a similar suit involving 386 microcode. AMD admitted copying Intel's 80386 microcode in its AM386SXL line but said it has the right to do so via a cross-licensing pact.

AMD said it would appeal the ruling. Intel, meanwhile, plans to go after AMD's 386 by asking this week for either a summary judgment to dismiss the 386 case entirely or a preliminary injunction that will prevent AMD from selling 386s, Dunlap said.

MICHAEL FITZGERALD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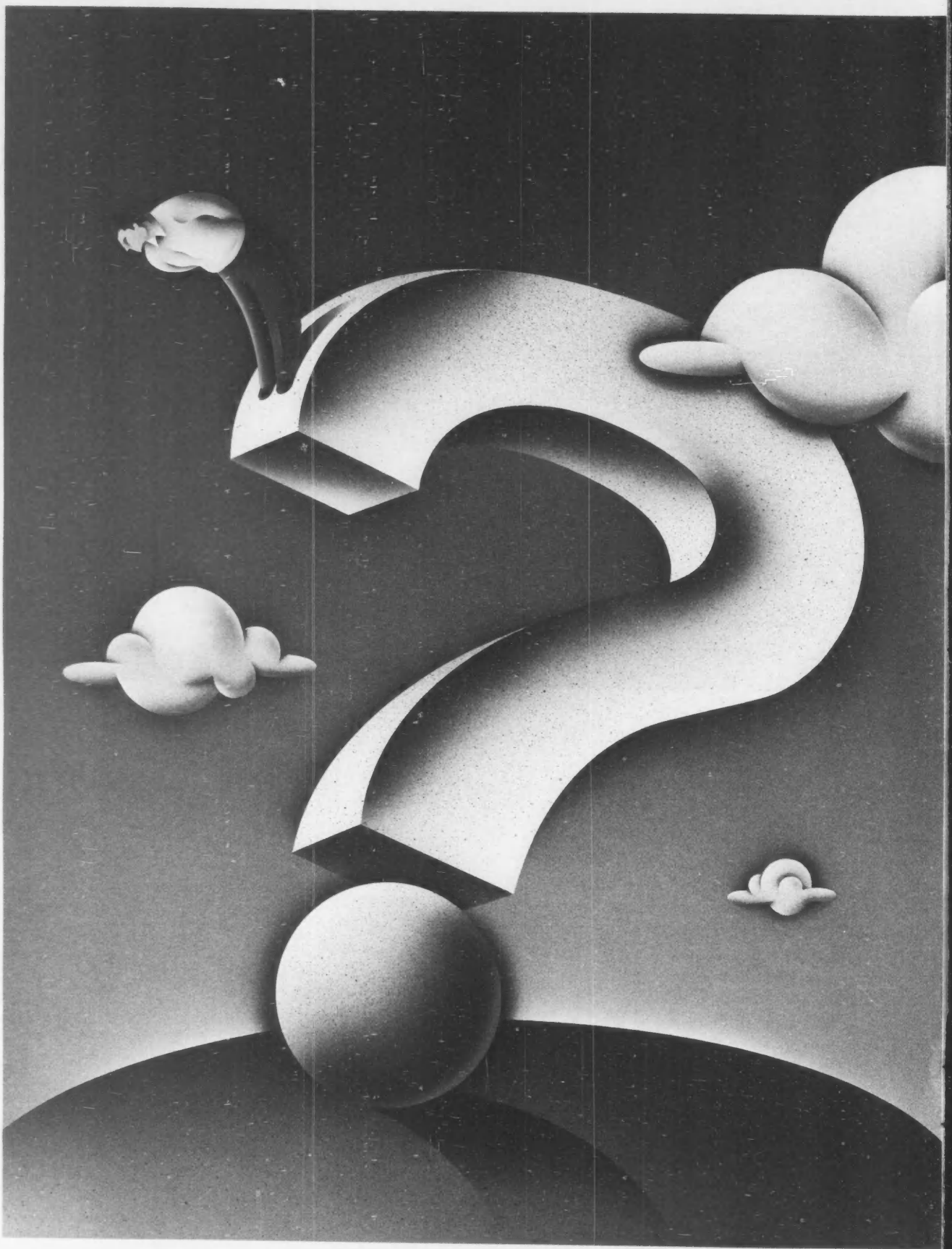

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ADVANCED TECHNOLOGY

Retailers brace for their own brave new world

From supermarkets to sporting goods stores, technology can change how we shop and how stores do business

BY ELLIS BOOKER
CW STAFF

After pondering long and hard about why people leave their homes to go into stores, analysts at Andersen Consulting in Chicago have reached this conclusion: People shop for things they know they need or to get ideas about what they might need.

That subtle distinction is critical for retailers hoping to understand "shopping" as it comes to be defined in the future, according to Frederick Schneider, director of Andersen Consulting's food and consumer packaged goods industry group.

Schneider was one of the primary architects of Andersen's Smart Store 2000. A research and demonstration laboratory established in May 1989, Smart Store has been given the mission to explore information technologies available to food merchants, suppliers and consumers.

Shopping models

Three years of work have presented the researchers with several models for the future of shopping.

In one scenario, Schneider and his Andersen colleagues predicted that consumables such as paper towels and most groceries will increasingly be ordered electronically from home — perhaps directly from manufacturers' inventories.

Combined with the rise of "alternative stores" — megamarkets and warehouse clubs offering steep discounts — this trend will put enormous pressure on traditional retailers, which many people say will survive only if they customize and target their inventories and services to the local environment.

"Retailers are finding they can't compete on pricing and so need to add value," Schneider said.

For example, in one Andersen model, food manufacturers eliminate the retailer completely, delivering products to neighborhood "consumer response centers," where shoppers pick up their bundled orders without ever visiting a store. Significantly, the model indicates this method of distribution would be 6% less costly than its retail competition.

Computers and networks will be an essential element of these alternative distribution arrangements. Nationwide networks such as CompuServe and Prodigy already offer consumers with personal computers and modems a way to shop, and recently, several supermarket chains across the country have begun offering local customers this convenience.

Anticipating these changing dynamics and competitive pressures, some supermarket chains have already responded by trying to differentiate themselves with the services they offer.

For example, one Midwest supermarket chain is experimenting with "solution areas" in its stores. The areas provide all the food, spices, utensils and advice for preparing a particular kind of dinner.

But retailers need information to accomplish such targeted marketing, and, in that respect, they have a long way to go, argued Steve Johnson, managing partner of Andersen's retail industry practice.

Robert DeMichiell

"They know a lot about what's selling, less about who's buying and almost nothing about why people aren't buying," Johnson said. That makes it crucial for retailers to find new ways to analyze point-of-sale data.

In April, Andersen opened the Retail Place, a companion center to the Smart Store that likewise displays an array of store and back-room information technologies against a realistic, market-specific backdrop. In the case of Retail Place, the setting is a sporting goods store.

According to Johnson, the survival of many retailers will require a three-pronged strategy: "They need to focus on the customer, they need to drive out cost, quality and time inefficiencies from their operations, and they need partnerships with others in their industry."

But this strategy won't apply to everyone. Stewart Neill, vice president of information systems at Saks Fifth Avenue in New York, put it this way: "Fundamentally, people in the retail marketplace have to avoid being in the commodity race. Or they have to be low-cost."

The price of high fashion

This difficult choice has not been one of his problems, Neill said, because Saks' inventory is both high fashion and high expense.

"Many of the very exciting things happening in retail don't apply to someone in our part of the market," Neill said.

For example, while Saks has looked at cutting-edge customer service technologies such as portable, pen-based computers for salespeople and electronic kiosks for shoppers, it has rejected them, deciding that they would provide the wrong ambiance for its discriminating clientele.

Will at-home shopping technologies forever change the dynamics of retailing? Will there be "virtual reality" stores in which shoppers navigate down aisles of familiar-looking products?

Opinions vary, and several observers point out that true arm-chair shopping will almost certainly require multimedia systems using as-yet-unavailable high-speed telephone networks.

On the other hand, it is worth noting that in the latest version of Andersen's evolving Smart Store, the first thing visitors see when they open the door is a mock kitchen and living room equipped with a PC, a bar-code reader and a cable television hookup, all of which are able to transmit the week's grocery order from the comfort of home.

COMPUTERS AND NETWORKS will be essential elements of alternative distribution arrangements in the retail industry. Already, nationwide networks such as CompuServe and Prodigy offer consumers with PCs and modems a way to shop.

Food for thought

The following technologies are making their way to groceries and retail stores near you:

- **"Self check-out" aisles** in which grocery shoppers scan their own bar codes. No cheating allowed! If one scans a can of tuna fish but puts a sirloin steak on the conveyer belt, the system detects the incorrect weight and sets off an alarm.
- **Automated teller machine-like systems** in the supermarket featuring recipe databases.
- **Video shopping carts** (already being tested in several markets) that present maps, specials and inventory information to the shopper based on the cart's position inside the store.
- **Touch-screen workstations** giving shoppers a chance to "see" different colors or patterns on a photo-realistic image of a product. Someday, this selection might be transmitted over a network and used to feed manufacturers' production systems.
- **Pen-based notebook computers** for salespeople. Equipped with wireless data interfaces to the store's main POS system, these portables would free salespeople to follow consumers around the store and record orders as they occur.
- **LCD pads** to replace paper receipts at the cash register. The pads can be configured with signature verification software for credit purchases.

ELLIS BOOKER

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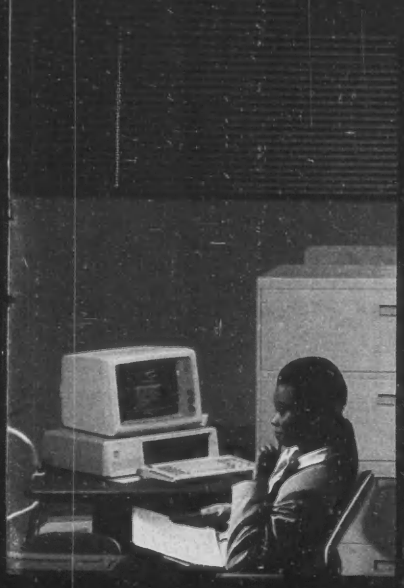

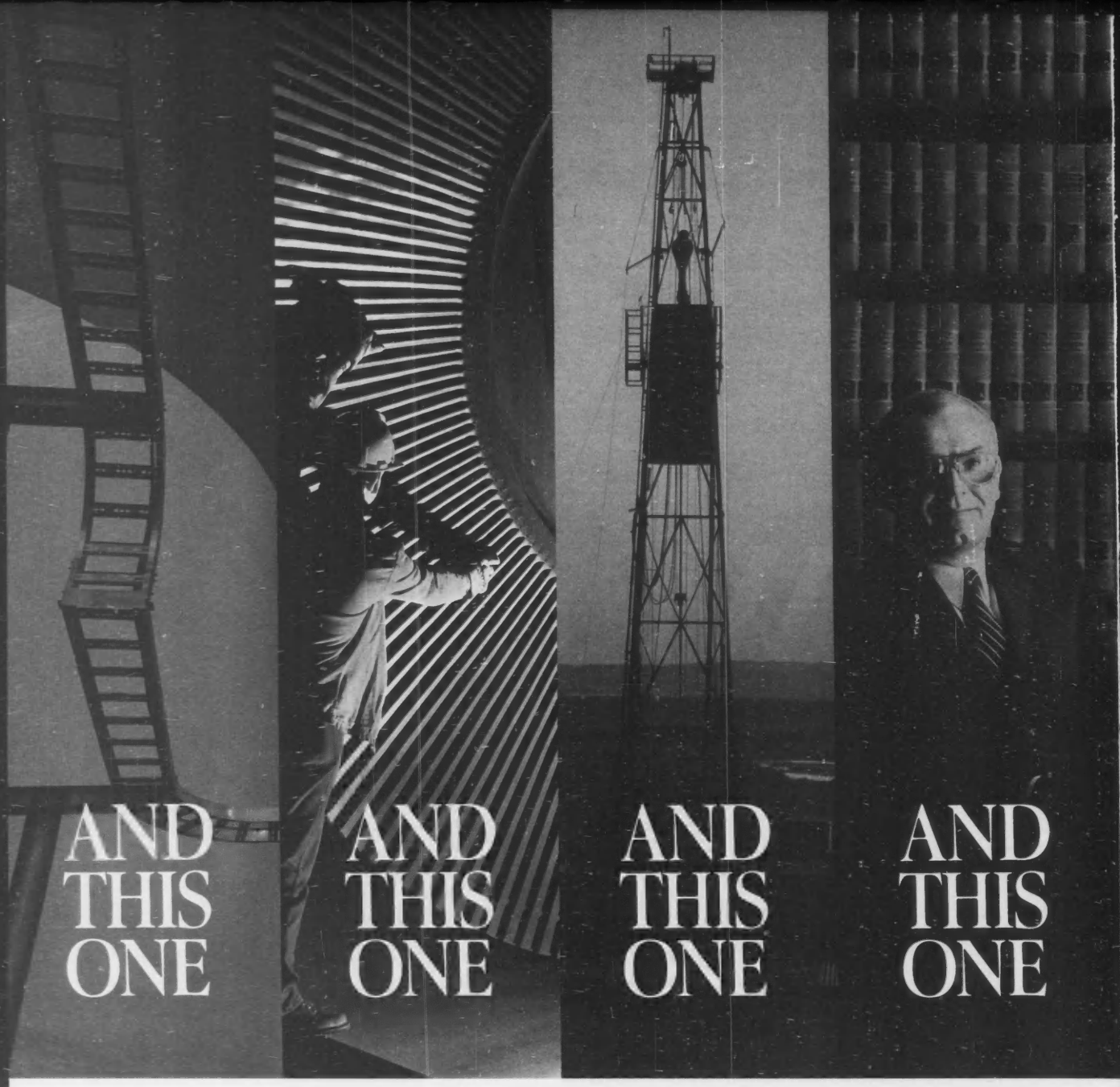

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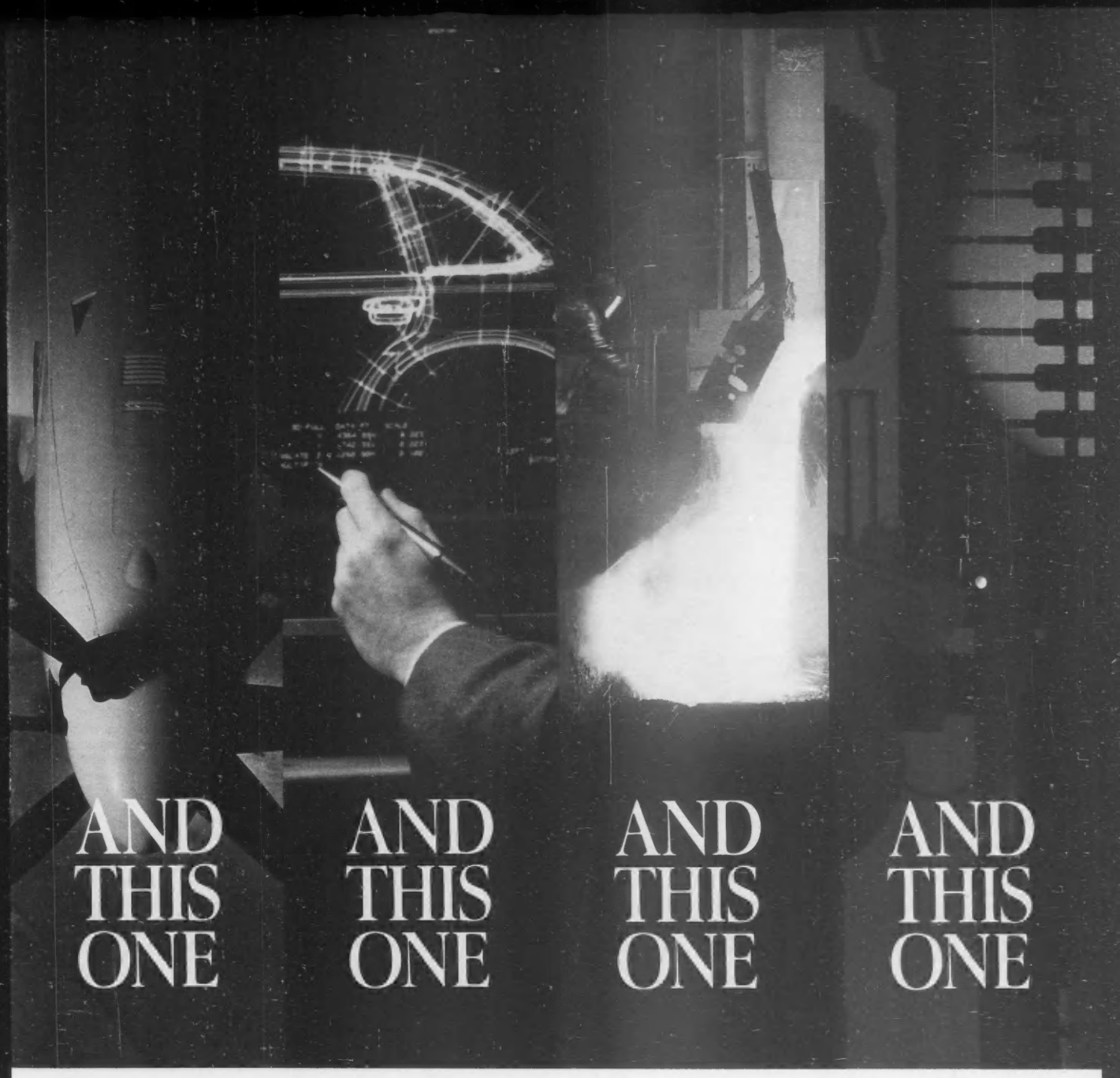

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EDITORIAL

In the beginning

Reprinted from Computerworld, *Vol. 1, No. 1, June 21, 1967 (all eight pages of it, before the advent of features sections and other modern innovations).*

Computerworld has put its primary goal into its motto — The Newsweekly for the Computer Community.

News is the most important part of *Computerworld*'s efforts — bar none. Our closing time is only a few hours before printing. We will bring you the freshest and most up-to-date news we can find.

News is our lifeblood, and news, as opposed to editorial pronouncements, etc., will always have front page treatment. Indeed, we think that news is so important that our cover will, whenever possible, reflect the news of the week, rather than some prewritten article.

Computerworld recognizes there will be broad and common interest in most computer stories. But *Computerworld* also recognizes various computer [interest] groups. They have their own news, their own opinions and their own events. In *Computerworld* they will have their own sections set aside for them. Equivalent to the "suburban" section in your large city newspapers, these sections will have their own section editors and their own news-gathering staff.

The computer community is people. People like you, Joe, at the next desk, Jean at chapter meetings, Jim who drops in when he's visiting the plant. People who have a real interest in computers or in the possibilities they open up. Programmers, analysts, managers, information retrieval experts all spring immediately to mind. But what are they programming? Where are they working? How many of us are there?

Frankly, there are many more of us than might be expected. We probably number about 300,000 professionals, and the community is growing fast.

Physically we can be working anywhere — almost every business, all professions and most human activities use analysts to find out just how computers can most benefit them. Tinkers, tailors, soldiers and sailors certainly do, and so do many more abstruse professionals working at disciplines that simply did not exist in the simple days before the computer.

Quite a community, and one we feel should be served — one which we are going to serve to the best of our ability. We will publish some of the problems of living in the community — you all know there are many of these. And we will try to help by suggesting solutions.

We hope that you will tell us of your triumphs and failures, your frustrations and your techniques for snatching success from failure. We hope so in order that we can pass them on to the community at large.

So there you have it. News — general and by computer groups. Community service for use at home as well as in the office. Interest for all those who work with the most exciting possibilities of our time — computers and computer people.

Patrick J. McGovern, *Publisher*

OK- THIS IS A LITTLE DIFFERENT FROM OUR OTHER GIGS. THESE GUYS ARE EXPECTING REAL CLASSY, SERIOUS STUFF. SO PUT AWAY YOUR "LOUIE LOUIE" CHARTS, TUCK IN YOUR TOGAS, AND KEEP YOUR BEER CANS OFF THE BANDSTAND.
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LETTERS TO THE EDITOR

FBI pipe dream

After reading "FBI seeks right to tap all net services" [CW, June 8], I am appalled.

We provide store-and-forward message services and electronic mail to clients throughout the world.

It would seem to us that anyone wishing to keep messages private can easily do so using equipment and software that is readily and cheaply available. The National Security Agency's attempts to suppress papers, patents and copyrights with respect to encryption are a clear indication that many of these methods are beyond their ability to crack at all, let alone at an affordable cost.

Who is kidding whom? The FBI-sponsored legislation would simply escalate what is already being routinely done. The Consultative Committee for International Telephony and Telegraphy is about to approve standards for public key encryption that are probably unbreakable.

Encryption of nearly all forms of communication, including voice and fax, is becoming routine and inexpensive. The passing of this legislation would simply escalate the current trend.

Does the FBI really think it can keep ahead of this technology?

Robert L. Taft
President
B-Link Ltd.
Brooklyn, N.Y.

Defense mechanisms don't help bias fight

Regarding "Women in charge" [CW, May 18], it appears that Ms. Barron is guilty of the sexual bias in the workplace against which she herself speaks.

I suggest that much of the resistance she encountered along the path to her current position may have occurred because she was put on guard to that "male-dominated business" thing (probably at Harvard, long a male bastion), so she developed defense mechanisms or subscribed to others to combat it.

One's defense mechanism for dealing with the "apparent" inability of men to accept women in the business world, then, may have promoted any bias men had against women in business instead of eliminating it.

Suggestion: Now that she is again in a position of importance and visibility, Barron should be a leader. She should transcend her bias and indoctrinate female and male subordinates and peers with a positive sense of teamwork: the right person for the job, no matter the sex. Focus on the solution, not the problem. Superiors will follow suit.

Defense mechanisms are for people who have something to hide or protect. I would think she's too busy to bother with such hidden agendas.

Jef Benedetti
Dallas

Inexperience is what caused headaches

I was amazed to read "Those *!@?#$ routers!" [CW, May 18]. As you stated correctly, the problem is not so much with the routers but with the "complexity of internetworking."

The people you interviewed were perhaps working with routers, but I got the distinct impression that their experience in "internetworking" was minimal, thereby leading to all the headaches recorded.

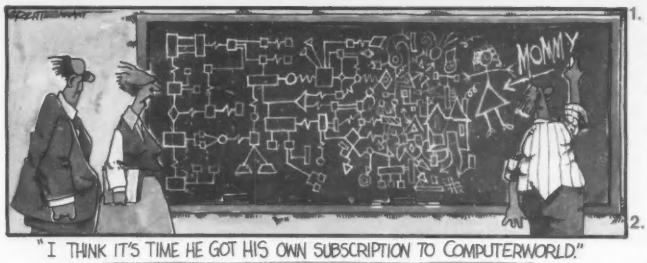
Taking someone from an IBM mainframe world, or perhaps a PC LAN environment, and assigning him to work with routers and interconnecting many geographically isolated networks is asking for trouble. No CIO would assign his Cobol applications programs to make an operating system modification, but it appears from your responses that that is exactly what has happened.

Two users in your article tracked their problems down to faulty digital service units and buggy NetWare servers — not routers. Another user complained that you need to "understand FTP and IP, so there was some frustration." That is like saying that it is difficult to install an IBM printer because one has to understand VTAM.

I can just as easily find eight very pleased users for an article on "Those wonderful routers!"

Hank Nussbacher
Ramat Gan, Israel

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor in Chief,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax number: (508) 875-8931; MCI Mail:* COMPUTERWORLD. *Please include a phone number for verification.*



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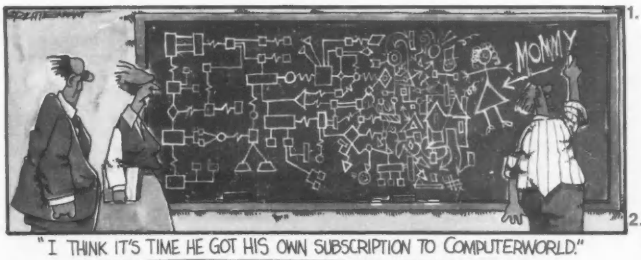

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Cut the ties, ditch the baggage

PETER G. W. KEEN

In a time of constant change and stress, the best form of profit is return on your own time.

Information technology offers fantastic leverage on time, but this benefit can't be gained by halfway measures or misguided attempts to reshape a bad situation around new technology. Tinkering around with the occasional laptop and having a fax in your bathroom won't make you productive, and neither will "re-engineering," unless it starts at the individual level.

"Re-" means try again; the office of the past and the small business of today were rarely engineered in the first place. They just sort of happened. What we need to do this time around is create a fresh design for productivity using technology to remove administrative chores that eat up valuable time.

Smaller but better

In 1988, my company, The International Center for Information Technologies (ICIT), had more than 50 employees. I cut this first to 15, then to seven, and now, as a result of multisourcing, there are just two of us plus a part-timer, handling twice as much business. By any measure of productivity, new ICIT completely outperforms old ICIT. The firm has not reorganized as such. What I have done is what I recommend to clients: Build a location-independent organization through telecommunications that delivers maximum return on individual labor.

Three years ago, I discovered location independence when I spent five weeks on St. John in the U.S. Virgin Islands without telling anyone and no one ever found out that I wasn't answering their calls or messages from Washington, D.C.

Now my home and office are both in the middle of the U.S. National Park on St. John. I rely on electronic mail, call forwarding, voice mail, on-line databases, plain paper fax, laptops and an image processing system. My total investment is less than $30,000. The payoff is huge.

I've learned many lessons in the last few years. I've learned how stealthily bureaucracies create themselves and how much of one's own time is lost. I've come to realize that what often looks like a high price for technology or an outside service turns out to be very low when return on your own time is counted. I've also discovered how often PCs and telecommunications make it far quicker and easier to do something yourself than to give instructions to someone else.

Small sacrifices

Flying out of St. Thomas or San Juan can be a nuisance, but it is a small one and the massive improvement in my own productivity more than balances it out. It usually takes me two years to complete a book. Last year, I published two. I estimate that I am three to five times more productive in other areas.

One reason is that staff are, alas, often not an asset. I estimate that, in the old days, at least 20% of my time went to "management." With 15 people, you need some form of hierarchy, however participative. With 50, you have the trappings and burdens of a "real" organization. At my company, the result was a lot of activity, with relatively little output, and I suspect that's true for many organizations.

Working smart and living in paradise seems like a much better plan to me. I can see no advantage that would ever induce me back or persuade me to add staff.

Keen is also a visiting professor at Fordham University. His most recent books are *Shaping the Future* and *Every Manager's Guide to Information Technology.*

Rollin McGraw

Portrait of hackers as young adventurers not convincing

PATRICIA KEEFE

Hackers may not be the "real" enemy, but weak efforts at rationalizing their illegal acts doesn't constitute much of a defense.

Chris Goggans, a self-described "member of the so-called 'computer underground,' " recently presented a hacker's point of view on this page. He asked *Computerworld* readers to put aside any objections they might have to his ethics and hear him out.

Well, I did that, and I still have problems with his ethics. His arguments amounted to one of the more bizarre exercises in rationalization I've read this election year.

The piece starts off by admitting that the actions of some hackers are illegal. Goggans then defies logic by stating that "they are still hardly criminal in nature." I don't know what dictionary he is using, but illegal and criminal usually go hand-in-hand.

None of their beeswax

The crux of Goggans' defense of hacking is that true hackers simply want to learn in "minute detail" how systems are used and what they are used for. Well, excuse me, but at the very least, *what* these systems are used for is none of any hacker's damn business.

Some of these "intellectually challenging" systems contain very confidential and personal information that hackers, no matter how careful they are to wipe their microchipped fingerprints, have no right to read. None.

How the systems were built could well be classified as proprietary information by businesses seeking a technologically based competitive edge. All of which explains why access to these systems is barred by such "unfortunate obstacles" as state and federal laws banning unauthorized computer access.

Get it?

I found it ironic that while Goggans bemoaned what he seems to see as a generally media-induced negative connotation surrounding hacking, he then proceeded to describe the drive to hack as akin to an obsessive addiction on the level of "drug or alcohol abuse, gambling [and] shoplifting."

It seems to have escaped him that none of these predilections are condoned or encouraged by society.

The image he paints of hackers is hardly a sympathetic one. For example, I wouldn't advise putting "inherent paranoia" or "distrust of authority" on a resume or bringing it up in a job interview.

I also found irritating a slight strain of "blame the victim." Goggans was right about one thing: The lack of security on the world's computers and networks is pretty shocking, but that's where we part company.

When bad things . . .

He says it is the responsibility of systems administrators to ensure they have the proper tools to secure their sites against intrusion. Well, sometimes bad things happen to good systems administrators. That doesn't make it their fault, and it doesn't take the hacker off the hook.

All in all, I found Goggan's viewpoint to comprise a pretty convoluted piece of logic from someone who's supposed to be a programmer.

Based on what I've read about hackers, in some cases written by them or based on direct interviews with them, I'd like to offer an opposing characterization of hackers: extremely nosy show-offs replete with authority complexes and lacking any sense of shame.

Keefe is *Computerworld*'s assistant news editor.

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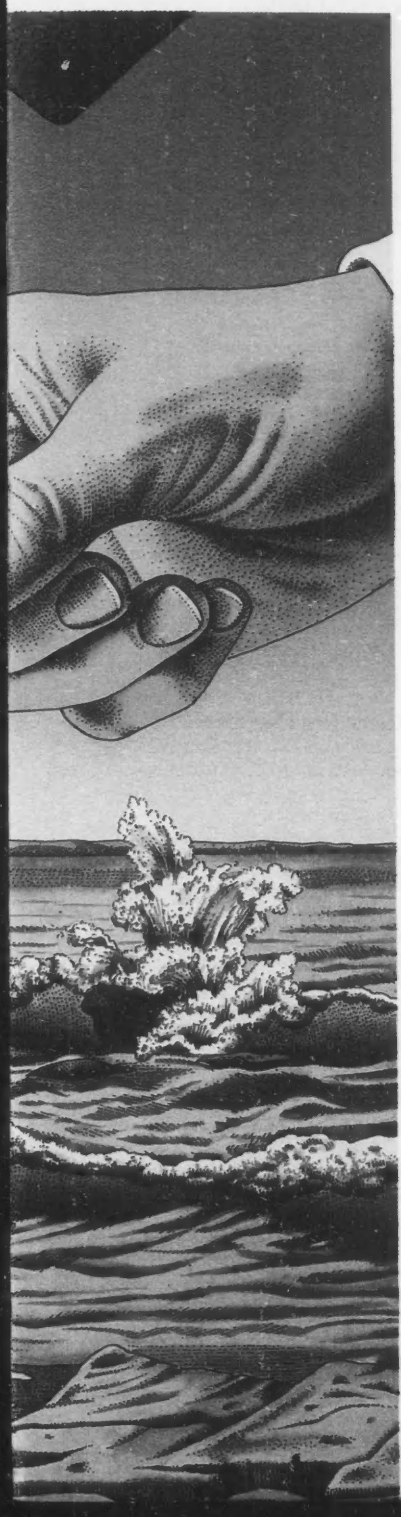

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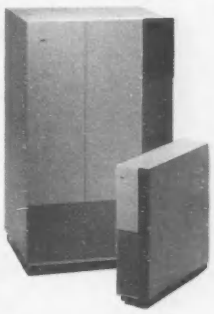

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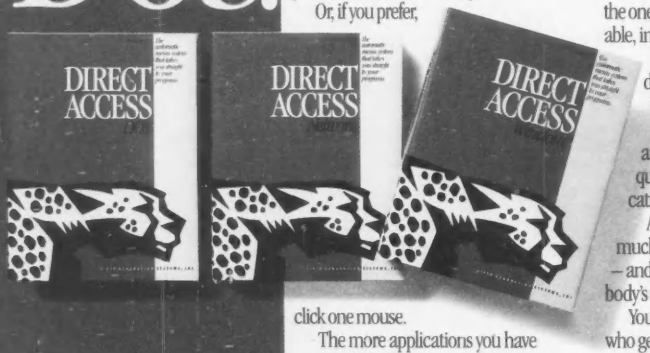

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Not very intuitive, eh?

Direct Access, on the other hand, gives you a multitude of utterly sensible program groupings – 17 of them.

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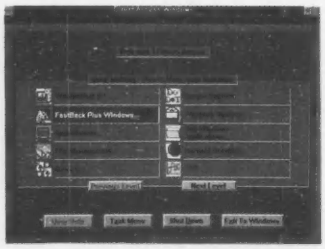

Direct Access searches your hard disk, groups your applications logically and generates menus and submenus automatically. All you have to do is point and click.

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FIFTH GENERATION SYSTEMS, INC

IN BRIEF

IBM inks multimedia contract

■ **IBM** signed an agreement with **Altec Lansing Consumer Products** to sell Altec's Multimedia ACS300 and ACS200 speakers with IBM's Personal System/2 Ultimedia M57SLC multimedia computer, marking IBM's first agreement to sell external speakers for its Ultimedia system. IBM also announced that it would market **Datalus, Inc.**'s MultiMedia DeskTop, an interactive presentation tool.

■ **Ergo Computing, Inc.**, based in Peabody, Mass., said it would use **Intel Corp.**'s 25/50-MHz DX2 486 clock-doubler chip in a product it calls the Ultra Moby Brick. The Ultra will also include built-in fax and data modems, Ethernet and a graphics accelerator. With a 212M-byte hard disk and 8M bytes of random-access memory, the Ultra will cost $6,095.

Users eye software distribution tools

BY CHRISTOPHER LINDQUIST
CW STAFF

Gene Friedman likens his current software distribution situation to a man on a bicycle riding around delivering 20,000 copies of software: pretty inefficient.

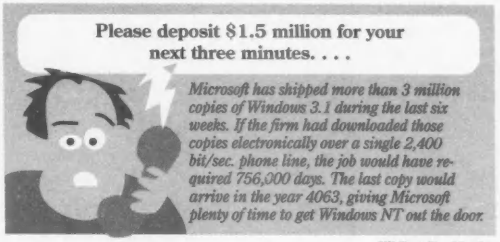
He said he hopes that will change. "With the proliferation of desktop computing and LANs, our ability to distribute, in a rational fashion, new software and updates is important," said Friedman, who is vice president of advanced technologies at Chase Manhattan Bank NA in New York.

Valuable assets

Electronic distribution, be it from vendor to buyer or from information systems department to end user, is but part of an overall problem of tracking and managing the personal computer software assets that many companies now value in millions of dollars.

Through electronic distribution and other means, Friedman has hope of easing the nightmare of tracking software licenses by allowing centralized control and monitoring of software distribution within his company, he said.

Current distribution schemes described by users range from "Sneakernet," with someone running around putting disks into machines, to internally customized distribution mechanisms allowing software to be transferred through mainframes and over wide-area networks. The work involved in either case is tremendous.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Microsoft has shipped more than 3 million copies of Windows 3.1 during the last six weeks. If the firm had downloaded those copies electronically over a single 2,400 bit/sec. phone line, the job would have required 756,000 days. The last copy would arrive in the year 4063, giving Microsoft plenty of time to get Windows NT out the door.

CW Chart: Tom Monahan

API in works

Software vendors seem aware of this. Several vendors, including IBM, Lotus Development Corp. and Microsoft Corp. have announced plans to develop an application programming interface (API) that would allow for easy and uniform tracking of software licenses and prevent violations [CW, May 25]. Such an API, used in conjunction with internal and external electronic distribution, could make the job of tracking software assets much easier.

Keeping track of what is installed out there is a bigger issue than distributing software electronically, users said. Software "could arrive here on a cattle truck, as long as it gets here and it works," said George Oliver, manager of information delivery technology at Royal Bank of Canada. The more important issue, Oliver said, is how he gets that software to the tens of thousands of workstations under his jurisdiction.

Key to the tracking process for IS management is making sure that companies are not violating copyright laws. "It doesn't take much to justify a simple tracking sytem," said Jeff Tarter, editor of "Softletter" in Watertown, Mass.

In addition to software piracy and copyright issues, many companies may be throwing away

Continued on page 39

PIM tools for Windows hit market

BY ROSEMARY HAMILTON
CW STAFF

Two personal information manager (PIM) packages hit the Microsoft Corp. Windows market last week.

Lotus Development Corp. officially announced The Organizer, which it acquired from UK-based Threadz Ltd. earlier this year. The Organizer becomes the company's key Windows PIM, while Lotus Agenda, one of the original personal organizers to be introduced, will remain a DOS product.

In addition, Lotus and Dell Computer Corp. said they plan to preinstall The Organizer on Dell's new notebook, the 320SLI, which was introduced earlier this month.

Tailored technology

Meanwhile, Jensen-Jones, Inc. introduced Commence. The company said the new product includes "agent technology" to tailor the software to particular needs.

Jensen-Jones also makes Current, a PIM that won it a partnership with IBM. IBM recently discontinued marketing plans for the stand-alone Current, but it will continue to sell a version that serves as a front end to IBM's OfficeVision.

Beyond the agent technology, Commence includes graphical and user interface improvements over Current, said Dana Houston, director of technical services at SalesLink Systems, a reseller that works with Jensen-Jones. "It has a better interface, while [Current] had the old Windows 2.11 look," Houston said. "They also redesigned the menu to make it more Windows-like."

Jensen-Jones said it plans to offer a $99 upgrade program to IBM Current users for Commence. The software is scheduled for availability within 30 days. New licenses are $395.

Meanwhile, Lotus has scheduled an August shipment date for The Organizer. The company picked up the product earlier this year and has since been adding Lotus technology, such as SmartIcons, to the software.

Lotus also plans to offer a $69 upgrade plan for Agenda users wishing to move to the Windows platform. A free conversion utility will be included with that price. New licenses have a suggested retail price of $149.

Pen industry shrugs off Momenta woes

BY MICHAEL FITZGERALD
CW STAFF

SANTA CLARA, Calif. — An undercurrent at the latest pen computing show swirled around the question of whether the slow-starting market would crash in the wake of a string of bad news at pen computing pioneer Momenta International.

"I was worried that with Momenta's problems, it might set back the whole pen industry," said Vern Raburn, chairman of Slate Corp. in Phoenix.

Raburn said his contacts with users show that in fact they have not reacted this way. Independent observers agreed.

"I don't think users will be affected by Momenta — it [doesn't] have much of a market," said William Bluestein, an analyst at Forrester Research, Inc. in Cambridge, Mass. "It will force a lot of venture capitalists to refocus on the software and tablet systems," he added.

Momenta, a vendor of combination pen and keyboard computers based in Mountain View, Calif., has had a rocky two months since it replaced Kamran Elahian, its founder and president, with Delbert Yocam, a former Apple Computer, Inc. executive. Yocam left after little more than a month on the job because of problems getting funding.

Yocam's exit *came in the middle of Momenta's turbulent times*

Momenta has also disbanded its sales force and dismissed one-third of its staff, including former Zenith Data Systems President John Frank, said John Rizzo, Momenta's vice president of marketing.

Rizzo added that a recent infusion of $10 million in cash has helped stabilize Momenta, which continues to seek a major partner — a search launched by Yocam.

Some saw Momenta's ills as being part of a young market. "The pen industry is a long way from being mature, with major vendors working on pilot programs with major customers. Until these bear fruit, the small company doesn't have any market to sell to," said Andrew M. Seybold, editor of "The Outlook on Professional Computing," an industry newsletter based in Brookdale, Calif.

Seybold predicted that several small software vendors will not survive the early days of pen computing, but that the technology itself will grow in use.

For now, though, the pen industry continues to produce more words than products, and those users who attended the Pen-based Computing Conference and Showcase here had the same complaint they have had for some time: They want products but cannot get them.

"We're still looking for hardware," said Melvin C. Hinton, senior engineer in the Meter Engineering & Test Distribution Systems group for Public Service Electric & Gas Co. in Hackensack, N.J. Hinton said, though, that his project otherwise remains on schedule in its early planning stages.

New version brings facelift to Autocad

Improved performance, new user interface and host of enhancements impress analysts

BY CAROL HILDEBRAND
CW STAFF

The first major AutoCAD upgrade in nearly two years debuted recently, as Autodesk, Inc. unveiled Release 12 of its flagship product.

Announced at the A/E/C Systems '92 show in Dallas last week, the product is a major upgrade of what many consider the de facto standard in the computer-aided design (CAD) arena.

The release is the first product announcement since Carol Bartz took over as president and chief executive officer at the Sausalito, Calif., company several months ago.

Although analysts said the product was released about six months late — in part because of the corporate restructuring — most were impressed with Release 12, which contains 174 enhancements.

"It looks like a great product. The improved performance and new user interface make it a very significant step forward," said Mike Seely, an analyst at Dataquest, Inc. in San Jose, Calif.

It is also a hefty offering, heavy on both documentation — 27 manuals — and disk requirements. Beta-test user Peter Sheerin, a programmer at civil engineering firm Wilsey & Ham in Foster City, Calif., said that to fully install everything would require 23M bytes of hard drive space.

However, Sheerin added that a typical user could probably prune the software down to a more reasonable 10M bytes.

Major enhancements include the following:

- AutoCAD's old character-based menu has been updated with a proprietary graphical user interface that uses icons, cascading menus and dialog boxes. Sheerin said the dialog boxes cut considerable time from such tasks as changing a characteristic — background color, for example — in a multilayered drawing. "A lot of people will cheer that the main menu is gone," Sheerin said. However, Release 12 is not the company's Microsoft Corp. Windows-based version, which is expected in December.
- Juiced-up graphics speed. The speed of the redraws and regenerations, in which a drawing must be redone, has been significantly bumped up. Zooming into a drawing previously required frequent regenerations, which in the new version have been nearly eliminated.
- Plotting has also been given a shot in the arm, with users now able to access preconfigured plotters from within a drawing. Previously, they had to exit AutoCAD entirely in order to access the plotters. A preview capability enables users to see how the completed drawing will look and how it will fit on the paper.
- Release 12 offers both upward and downward compatibility with Release 11: Drawing files can be transferred in either direction. Both Seely and Sheerin lauded the product's compatibility improvements. "This is the first time I've ever heard about backwards compatibility," Seely said.

Two versions of AutoCAD, the DOS 386 and Sun Microsystems, Inc. Sun-4/SPARCstation platforms, will be released by the end of the month, with pricing slated at $3,750.

New sound for PC quality

BY MICHAEL FITZGERALD
CW STAFF

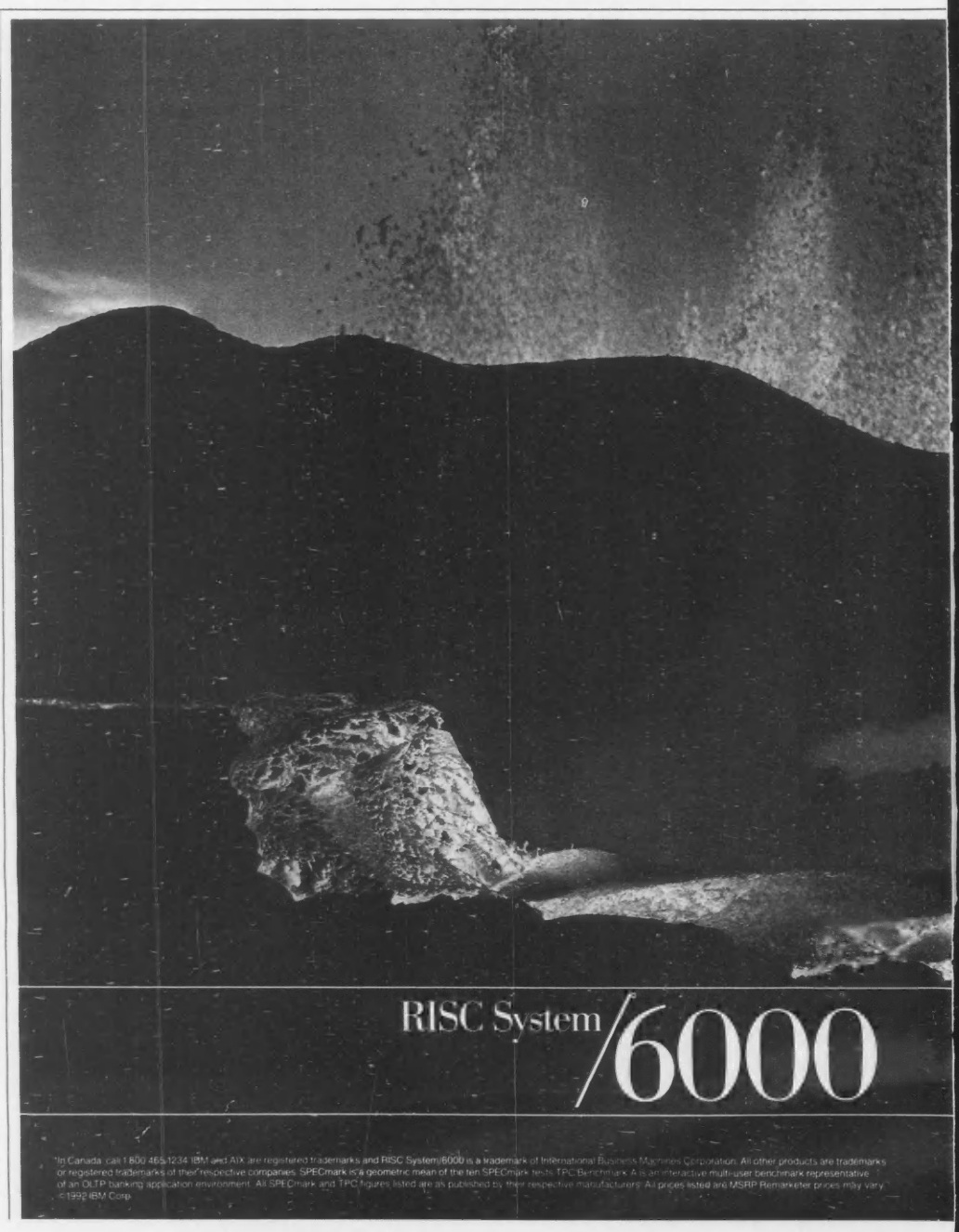
NORTHVALE, N.J. — Multimedia is stirring up vendors' creative juices. One start-up recently joined the market for personal computer audio devices.

VocalTec, Inc. introduced its compact audio technology (CAT) device. CAT offers compact disc-quality sound in a 3.9-by 2.2-in. package that plugs into the back of a standard printer port on either a desktop or a portable PC. It supports both the multimedia PC and VocalTec data file digital audio standards.

CAT also has a built-in compression utility to reduce the hard disk space its files need. It also requires a microphone and speakers, which are sold separately.

CAT runs under Microsoft Corp.'s Windows environment and comes with play and record software, a volume control and Lotus Development Corp.'s Lotus Sound, a sound annotation product. The $179 product aims to compete with the $129 AudioPort from Fremont, Calif.-based Mediavision, Inc. and is offered for uses such as annotating voice to software and presentations.

One user said each product has strengths. "The VocalTec product has higher sound quality; however, Mediavision's has a built-in speaker," said Sheldon Laube, national director of information and technology at Price Waterhouse.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Tracking tool helps users keep data files under control

BY CHRISTOPHER LINDQUIST
CW STAFF

As disks and personal computer networks get larger, the potential for losing track of data becomes greater. To help prevent this problem, Buffalo Grove, Ill.-based Zylab, a division of Information Dimensions, Inc., has created ZyIndex 5.0.

ZyIndex 5.0 permits end users to index and track a wide variety of text, graphics and database files. An array of search tools allows both extremely general and highly specific searches. Techniques include searching by words, phrases, wildcards, date ranges, Boolean operators and synonyms, among others.

"The [Zylab] product, especially the new release, offers us so many capabilities, and the speed of indexing and retrieval is better [than previous versions]," said John Karlin, president of Progressive Technologies, Inc., in Gaithersburg, Md. Karlin's company is using ZyIndex to develop an integrated imaging/optical character recognition/document retrieval system for NASA. "Nothing under $5,000 can touch ZyIndex," he added.

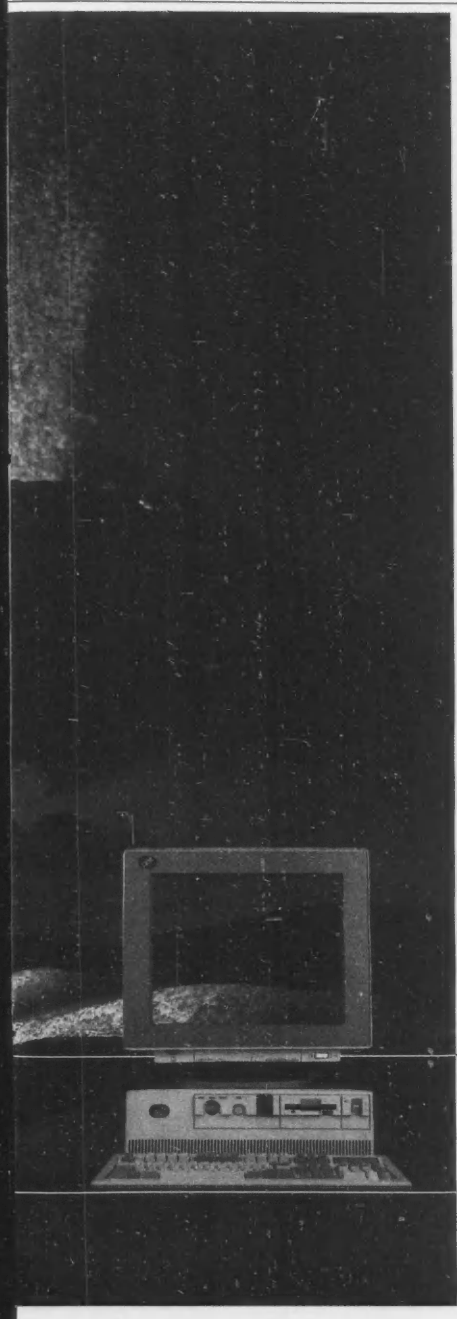
As documents are added to the system, ZyIndex automatically updates its internal indexes rather than requiring manual additions. Up to 50 million documents can be added to each index. Zylab claims an index creation speed of 10M bytes per hour on a stand-alone 33-MHz 80386-based system with 4M bytes of memory.

Graphics can also be indexed by key word, and Borland International, Inc. dBase-compatible data and memo fields can be searched. ZyIndex only allows files to be viewed, but a Launch feature can execute an application suitable to edit the currently retrieved file. Files, including graphics files, can also be printed directly from ZyIndex.

It is compatible with all major network operating systems, including Novell, Inc.'s NetWare and Microsoft Corp.'s LAN Manager. Supported text file formats include WordPerfect Corp.'s WordPerfect and WordPerfect for Windows, Microsoft's Word and Word for Windows, Lotus Development Corp.'s Ami Pro, ASCII and ANSI.

Graphics file formats supported include PCX, BMP, Tagged Image File Format and embedded graphics in Word and WordPerfect files.

Pricing for ZyIndex 5.0 is $395 for a single-user license, according to the company. A network bundle for three concurrent users lists for $995.



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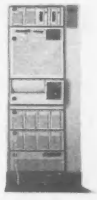

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IBM

Software distribution

CONTINUED FROM PAGE 37

large amounts of software as users and machines are constantly switched around, Tarter added.

"It's one way technology could help us a lot," said Michael Steenberge, director of information services at Corning, Inc. in Corning, N.Y. Licensing and managing software across his company's 5,000 to 6,000 PCs is critical, he said, particularly as he begins to move the stand-alone workstations to a local-area network.

Such technology is on the way. Lotus later this year is expected to unveil a Lotus' Notes application, currently codenamed Lynx, that will reportedly provide an easy way to distribute and license software on networks.

In addition, a Boulder, Colo.-based start-up, Infonow Corp., will offer a subscription software purchasing and management service this quarter for a suggested list price of $1,295. Subscribers will receive a compact disc/read-only memory (CD-ROM) drive, Microsoft Windows-based search software and a monthly CD-ROM containing evaluation software. Users will be able to try the supplied software, then purchase a license.

Various forms

Some companies have been promoting electronic distribution in its various forms for some time. Annatek Systems, Inc., which Novell, Inc. plans to purchase, has a product called Network Navigator that allows users to distribute software from hosts, servers or workstations across LANs, WANs and dial-up lines. Meanwhile, Software Spectrum in Garland, Texas, recently announced its Diamond product, which distributes PC software via mainframes or LANs.

Traditional software dealers are also looking for ways to help their customers distribute and manage software.

Sharon Stoffolano, manager of customer systems at Corporate Software, Inc. in Canton, Mass., said she has talked to more than 150 users in an effort to determine the best means to meet users' needs for both external and internal distribution. "It has been recognized that most of the cost of investing in PC hardware and software occurs after the purchase," she said. "Corporate America has realized that they have to manage [software] as an asset."

Interleaf backs document standard

BY CAROL HILDEBRAND
CW STAFF

Interleaf, Inc. announced support of an international standard recently. The Waltham, Mass.-based company will come out with a series of tools that comply with Standard Generalized Markup Language (SGML).

SGML is a structured authoring environment and data format that allows information in documents to be shared across platforms and applications. Because it does not depend on any single vendor's equipment but instead provides an open environment, the language has been adopted by a number of industries with heavy technical documentation needs, such as the automotive industry, telecommunications companies and the U.S. Department of Defense.

Data recycling

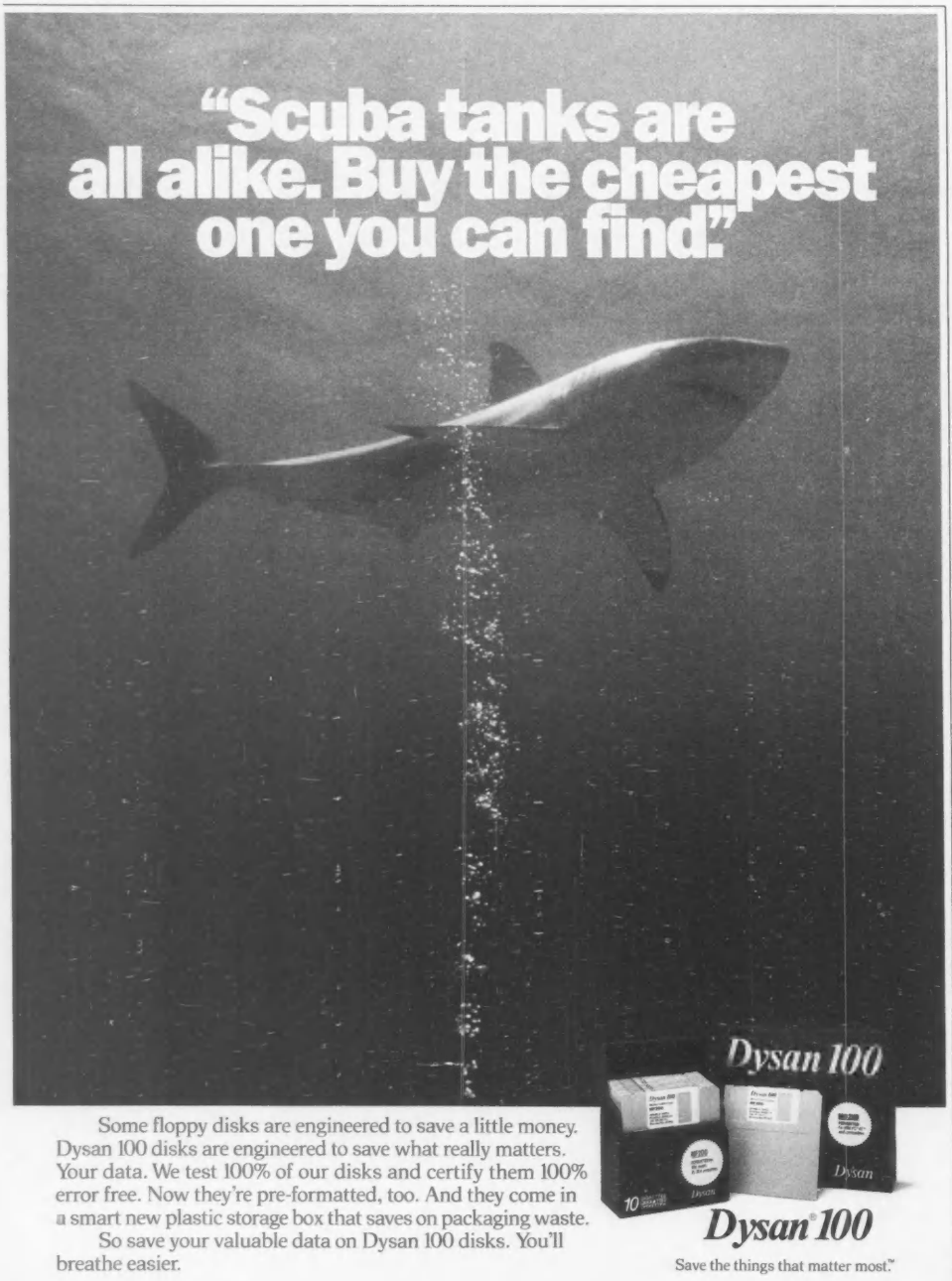
David Weinberger, director of strategic marketing and communications at Interleaf, said firms using SGML can more easily reuse chunks of information in different documents, such as maintenance manuals for similar car models, because the data is described by structure and content rather than format. "If you save in SGML, you don't have to worry about what happens to a particular vendor," he said.

Mark Walter, a consultant at the Seybold Consulting Group in Media, Pa., said that although SGML is currently a niche market, "Interleaf is really the first shrink-wrapped publishing package to have full SGML support. It really is essential for them to maintain their position at the higher end of the market for multiuser editing systems, and this acts as a differentiator" between them and products such as Microsoft Corp.'s Word.

Interleaf announced the following products:

- Interleaf 5 (SGML), the SGML version of Interleaf's flagship offering, allows what-you-see-is-what-you-get creation of text and graphics while adhering to the structural requirements of SGML document type definitions (DTD), a built-in format police used by the language.
- Interleaf (SGML) Gateway is a tool designed to migrate existing Interleaf documents over to the SGML structure.
- Interleaf 5 (SGML) Toolkit is a development environment that provides complete support for SGML applications. For example, it would allow creation of the DTDs for a particular document.

Interleaf 5 (SGML) and the Toolkit will be available late this month or early next month; the Gateway is slated for fall availability, according to the company. Pricing has not yet been finalized.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Tool relieves project woes

BY CHRISTOPHER LINDQUIST
CW STAFF

Current project management software packages have developed a reputation for complexity that can befuddle new users. But users who find their project management programs more time-consuming and difficult than the projects they are trying to manage may find help in Project KickStart from Berkeley, Calif.-based Experience in Software, Inc.

Project KickStart is a DOS-based "computer-aided thinking" package designed to help users set up the initial stages of project management such as creating task lists and assigning resources.

Users are guided through 10 steps intended to help them determine project phases and goals. Reports can then be generated and data can be sent automatically to a variety of project management packages such as Microsoft Corp.'s Project, Computer Associates International, Inc.'s SuperProject and Symantec Corp.'s OnTarget and Time Line.

User-friendly

Project KickStart's easy-to-use interface and functional simplicity are targeted at users who find starting out with traditional project management packages daunting.

"All these scheduling packages — as they've added more and more features, their user-friendliness goes way, way down," said Joe Fusco, a project management consultant at Technical Pathways in San Francisco who has used a large number of project management products.

Fusco said that while Project KickStart may not have the power or flexibility of full project management packages, its ease of use and ability to transfer data to other packages give users an ideal entry point.

"Without even reading the manual you can get a task list together and get some resources assigned," Fusco said. "It's built for guys like you and me who want to get a project done and don't want to climb Mt. Everest to do it."

Project KickStart is available for an introductory price of $97.50.

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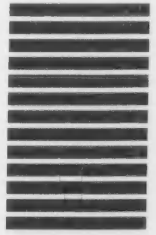

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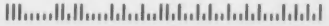


WINDOWS POINTERS

Check the AUTOEXEC

Part of a series of Windows 3.1 user tips provided by Microsoft Corp. and based on questions commonly asked of Microsoft customer support personnel.

Q When I start File Manager, I see the following error message: "Cannot read from drive I." What causes this?

A An MS-DOS Version 4.X file named GRAPHICS.COM may be the cause. Try removing from your AUTOEXEC.BAT file the command line that specifies GRAPHICS.COM. If you choose the OK button when you receive this error message, File Manager displays all of your drives. However, it cannot access any of your files.

The MS-DOS Version 5.0 GRAPHICS.COM file does not cause this problem.

Q I use Stacker. Can I set up a permanent or temporary swap file on a "stacked" disk drive?

A Windows 3.1 does not support the use of a permanent or temporary swap file on a stacked drive. A stacked drive is one on which you are running Stac Electronics' Stacker utility. To use a swap file with Stacker, you must create a nonstacked partition for the swap file.

For more information, see the Stacker manual.

Q What is the most comon reason for an unsuccessful Windows installation?

A Terminate and stay resident programs (TSR) loaded from the CONFIG.SYS and AUTOEXEC.BAT files are the No. 1 cause of an unsuccessful Windows installation.

If you are having difficulty with Windows setup, insert a system disk in your floppy drive and start your computer. The system disk should contain AUTOEXEC.BAT and CONFIG.SYS with no device drivers or TSRs loaded unless necessary to access the hard drive.

If you use any special drivers for your hard drive, such as Disk Manager or Stacker, make sure the drivers are in your new CONFIG.SYS and AUTOEXEC.BAT files and also on the floppy disk.

DEC ships Vivace, Browser for Windows

BY MELINDA-CAROL BALLOU
CW STAFF

Digital Equipment Corp. recently began shipping Vivace, a desktop manager for Microsoft Corp. Windows users, and Version 2.0 of Browser for Windows, an information navigator that helps users find information on personal computer-based local-area networks.

Vivace targets beginning to intermediate end users and allows them to more easily manage documents, applications and network services, DEC officials said.

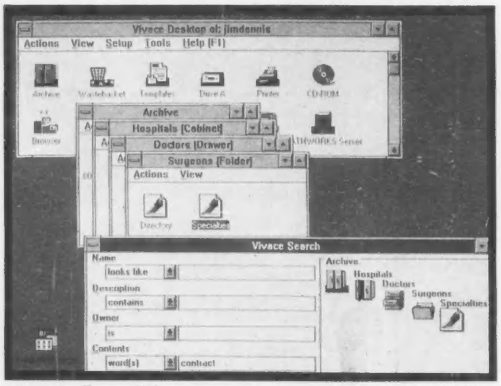
Users can start up any of 40 popular PC applications by clicking on an application icon, and additional applications can be integrated into the product using a scripting feature, according to DEC.

Vivace lets users drag and drop documents to various devices that are represented as icons, such as printers or fax machines. Users can also integrate new peripherals or network services. The product also offers a Boolean search capability that allows users to find documents of which they may have forgotten the name or location.

Multiple support

The new version of DEC's Browser offers support for DEC's Pathworks PC Mail folders and Conferencing. It also supports Microsoft Mail for Windows via the MAPI interface and Lotus Development Corp.'s CC:Mail for Windows. Users can also now save search criteria for later or for repeated use. The product can also be used to maintain multiple search result windows for global searches.

Vivace is available now and is priced at $145.



Vivace allows *Windows users to manage documents, applications and network services more easily, according to DEC*

Browser Version 2.0 will be available this summer and is priced at $95.

NEW PRODUCTS

Software applications packages

SBT Corp. has started shipping the SBT Professional Series 2.0 accounting system.

SBT Professional Series 2.0 offers an assortment of accounting software functions, including accounts payable, accounts receivable, general ledger and inventory control.

The system is linked with the current versions of SBT Fixed Assets and SBT Payroll. Full mouse support and pull-down menus are included.

The recommended workstation environment for Professional Series 2.0 is an IBM-compatible, Intel Corp. 80386-, 20-MHz-based system with 4M bytes of random-access memory running DOS 5.0 with NetBIOS or Novell, Inc. networks.

Professional Series costs $1,295 per application.

SBT
1 Harbor Drive
Sausalito, Calif. 94965
(415) 331-9900

Fifth Generation Systems, Inc. has introduced Untouchable Version 1.1 and Untouchable Network Version 1.1 personal computer and network antivirus software.

Untouchable 1.1 includes enhanced generic recovery, smart file access technology, archived file scanning and internal scanning of compressed files. Users can modify text files and use a new three-dimensional interface with graphical icon depictions.

A self-mutating virus detection feature is also included. Untouchable 1.1 can recognize more than 1,000 known viruses with a virus-specific scanner.

It is priced at $99.

The 10-node Untouchable Network starter kit costs $695. The starter kit includes the server package of full supervisor documentation and software and 10-node license agreements.

Fifth Generation Systems
10049 N. Reiger Road
Baton Rouge, La. 70809
(504) 291-7221

Aspect Technologies, Inc. has announced PC Access Security System Version 3.1, which is compatible with Microsoft Corp. Windows 3.0 and 3.1.

Two levels of password and identification security, audit trail functions and floppy disk drive disable capabilities are included in the system.

PC Access Security System is compatible with any personal computer running DOS or Windows; it also supports Novell, Inc.'s NetWare.

PC Access costs $129.95.

Aspect Technologies
7435 S.E. 71st
Mercer Island, Wash.
98040
(206) 236-7360

Macintosh products

RasterOps Corp. has created PaintBoard Li, a 24-bit graphics display adapter.

PaintBoard Li provides Apple Computer, Inc. Macintosh II users with support for 20-in. monitors and an adapter for accelerated production of photorealistic images. PaintBoard Li supports extended desktop, gamma selection, hardware pan and zoom, as well as bit depths of 1, 2, 4, 8, 16 and 24 bits per pixel.

A number of displays can be maintained, ranging from the 13-in. AppleColor High Resolution RGB monitor and the RasterOps Sweet 16 up to the RasterOps 20-in. Trinitron monitor with 1,024- by 768-pixel resolution.

PaintBoard Li costs $999.

RasterOps
2500 Walsh Ave.
Santa Clara, Calif. 95051
(408) 562-4200

Sigma Designs, Inc. has announced the Power Portrait, a plug-and-play 15-in. display for Apple Computer, Inc.'s PowerBook notebooks and compact Macintosh computers.

Power Portrait is a Small Computer Systems Interface (SCSI)-based display that plugs directly into the SCSI port of any compact Macintosh or Macintosh-compatible portable computer. Three choices of resolutions are available, and users can create a two-page desktop up to 1,024 by 1,024 pixels using the Power Portrait's hardware pan mode.

Power Portrait's platinum model includes DB-25 to DB-25 cable and costs $995.

The granite model includes HDI-30 to DB-25 SCSI cable and costs $1,095.

Sigma Designs
47900 Bayside Pkwy.
Fremont, Calif. 94538
(510) 770-0100

Adobe Systems, Inc. has expanded its version of Type On Call CD-ROM for Apple Computer, Inc. Macintosh computers.

Typefaces in release 2.0 are encrypted. Access to the typefaces is available once the compact disc/read-only memory user buys access codes from Adobe. As soon as the access codes are put into the user's Macintosh control panel, the typefaces become immediately usable, the company reported.

Access codes can be read off of the user's old control panel.

Previously purchased typefaces are automatically unlocked on the new disc.

Type On Call CD-ROM costs $99.

Adobe Systems
1585 Charleston Road
Mountain View, Calif.
94039
(415) 961-4400

Systat, Inc. has started shipping Systat 5.2, a statistics and graphics package for Apple Computer, Inc. Macintosh computers.

Systat 5.2 supports Apple's QuickTime system software. Users can manipulate time-based data such as animation, sound and video on the Macintosh.

According to the company, this version offers improved speed of processing and responsiveness of user interface.

Systat Version 5.2 costs $895.

Systat
1800 Sherman Ave.
Evanston, Ill. 60201
(708) 864-5670

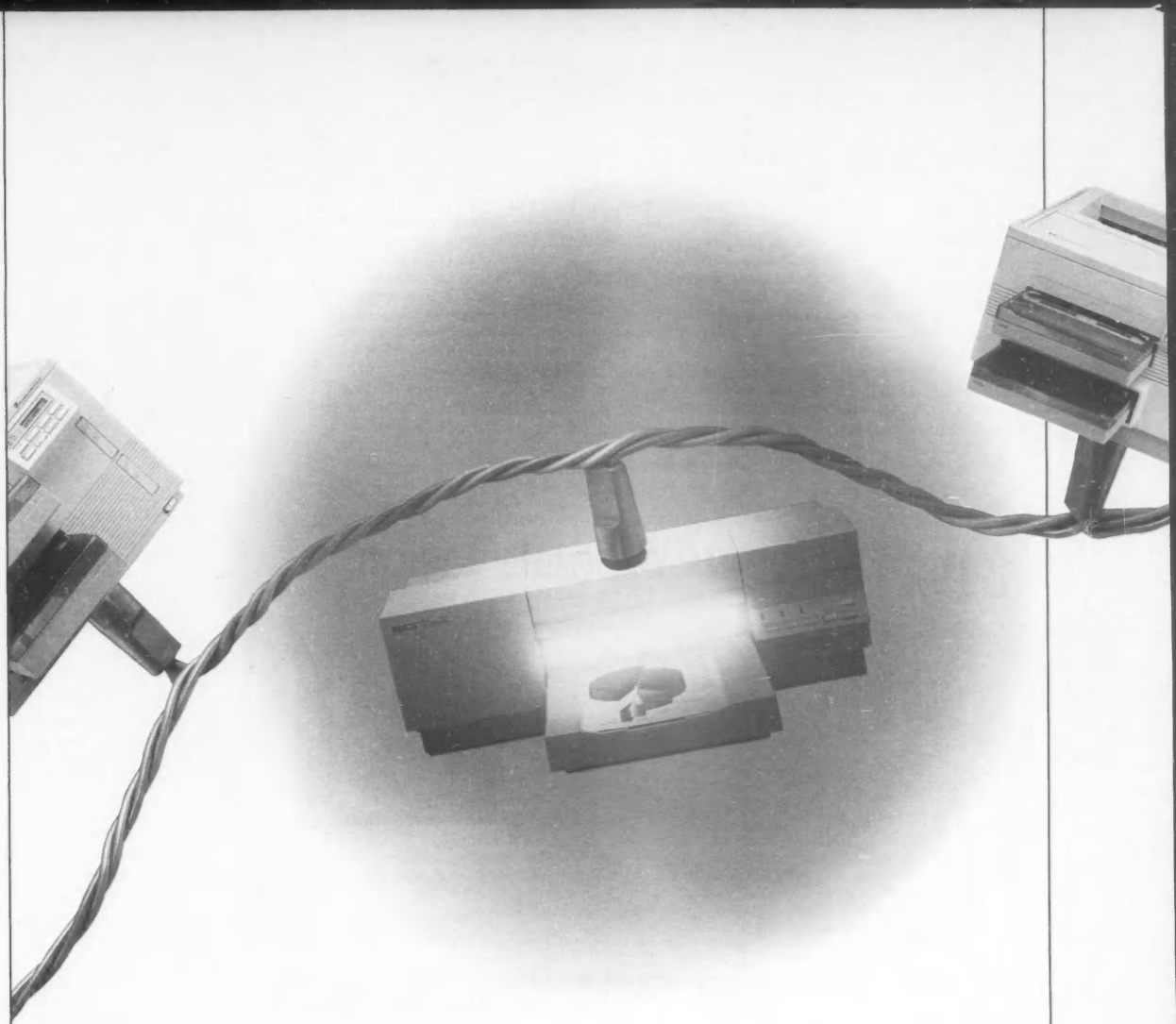
Peripherals

Bell Atlantic Computer Technology Services has introduced the Mini Disk Tester, a portable disk tester, verifier and formatter.

The Mini Disk Tester includes both a basic library of program keys and a list of optional program keys that test several disk drive models. Users can select individual tests that isolate drive subsystem problems, such as head failures and media defects.

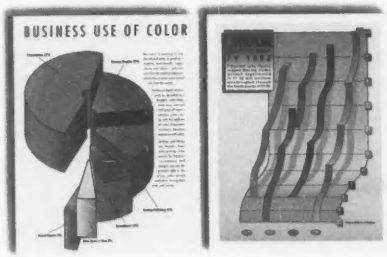
According to the company, the Mini Disk Tester does not require an ancillary personal computer or terminal for successful operation.

Continued on page 44



HP's PaintJet XL300. Now, brilliance doesn't require genius to install.

At last. A 300 dpi color printer that's as easy to add to your system as a LaserJet.



Vivid color has never been so simple. The new PaintJet XL300 inkjet printer gives you laser-quality color graphics, text, and the compatibility of HP LaserJet printers. All for the remarkably low price of just $3,495.*

The PaintJet XL300 has LaserJet compatibility built right in. The same typefaces. The same page formatting. It also has PC/Macintosh auto-switching, so users in a mixed environment can share. And, just like a LaserJet, the PaintJet XL300 becomes network-ready with optional HP JetDirect interface cards.

Get laser-quality printing on a choice of media that includes plain paper and transparencies. Or add Adobe® PostScript® for access to even more graphics applications.

See how easily the PaintJet XL300 can bring color to your system. Call **1-800-752-0900, Ext. 3158** for a free print sample and the name of the authorized HP dealer nearest you.†

HEWLETT PACKARD

© 1992 Hewlett-Packard Company *Suggested U.S. list price. Adobe and PostScript are registered trademarks of Adobe Systems, Inc. in the U.S. and other countries. †In Canada call 1-800-387-3867 Ext. 3158. PE12205

Continued from page 42

Pricing for the Mini Disk Tester starts at $5,700.

Bell Atlantic
4700 Calle Bolero
Camarillo, Calif. 93012
(805) 987-8628

Farabi Technology Corp. has announced Twex Junior, an IBM register-level-compatible 5250 terminal emulation adapter card.

Twex Junior allows all IBM 5250 emulation software, IBM Application System/400 personal computer support and IBM diagnostics to be used without any modification.

The product can be installed in any XT/AT bus or compatible and Personal System/2 Models 25 and 30 and can be used in laptops. Interrupt selection is done internally, and switch selectable I/O addresing is identical to IBM's.

Twex Junior costs $399.

Farabi Technology
2439 Guenette
St. Laurent, Quebec
H4R 2E9
(514) 332-3455

Presentation Electronics, Inc. has announced the addition of Microsoft Corp.'s Windows mouse control to its current version of SilentPartner.

SilentPartner is a handheld remote control product for personal computers and Macintosh computers.

With this version, users can control the mouse pointer, click and drag and use the remote control buttons to direct mouse commands from as far as 50 feet away, the company reported.

SilentPartner has full keyboard emulation and comes with 60 virtual buttons that can contain up to 132 keystrokes and/or mouse commands.

SilentPartner costs $399.

Presentation Electronics
4320 Anthony Court 8
Rocklin, Calif. 95677
(916) 652-9281

Microtest, Inc. has renamed Next Scanner to the MT340 Scanner.

According to the company, the change more accurately reflects the multifunctionality of the product and its automated cable testing capability. Cabling problems are pinpointed when the MT340 performs Time Domain Reflectory tests.

An Autotest function for certifying new and current network wiring allows the user to enter the cable and network type and automatically determine which tests are appropriate. The tests are run and the result is displayed. If the cable fails, the MT340 indicates where the fault occurs and why.

The MT340 costs $3,495.

Microtest
Suite 134
3519 E. Shea Blvd.
Phoenix, Ariz. 85028
(602) 971-6464

Sysgen, Inc. has started shipping the Mobile Disk 200, a portable hard disk drive.

Mobile Disk 200 plugs into the parallel port of any personal computer and adds storage, security, backup, or data portability. The product transports up to 210M bytes of data between PCs and locations.

Regardless of the host's utilities or software applications, users can take all their software and files to any DOS-compatible PC, Personal System/1, PS/2 or laptop and access them.

Users who do not have hard drives on their PCs or laptops can use the Mobile Disk 200 as a storage upgrade solution, according to the company.

Mobile Disk 200 costs $1,250.

Sysgen
556 Gilbraltar Drive
Milpitas, Calif. 95035
(408) 263-4411

Training

InfoSource, Inc. has introduced the Seminar-On-A-Disk series for Lotus Development Corp.'s 1-2-3.

Version 2.3 is a training package made up of four modules. Each contains a manual, interactive disk tutorial, sample applications and guided exercises.

Basic Lotus 1-2-3 tasks are covered, including Fundamentals, Database Management, Macros and Graphics, the company reported.

The Seminar-On-A-Disk series for Lotus 1-2-3, Version 2.3, costs $79.95 per module.

InfoSource
6947 University Blvd.
Winter Park, Fla. 32792
(407) 677-0300

Software utilities

SoftLogic Solutions has introduced Version 6.0 of Software Carousel, a program for personal computer task switching.

Version 6.0 has a built-in screen saver function that prevents an image from being burned into the video display and permanently damaging it.

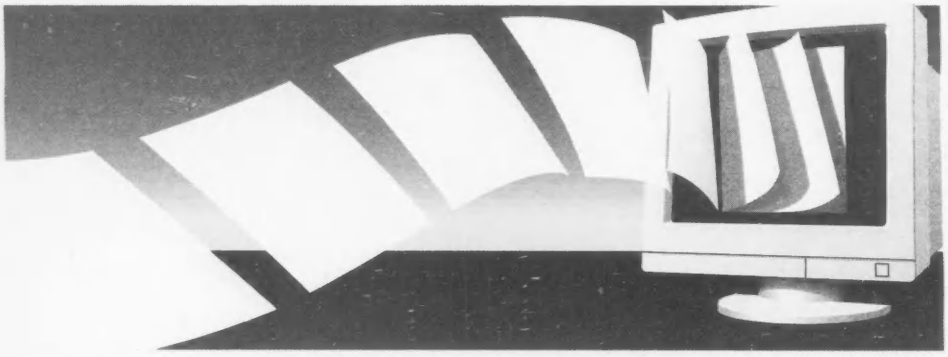
A revised personal message center reminds users of important meetings or telephone calls. New menus are included featuring a zoom key, according to the company.

This version has Print 'N' Run, a high-speed print output optimizer, and Snip 'N' Snap, Carousel's data transfer program that transfers data among different programs.

Software Carousel Version 6.0 costs $89.95.

SoftLogic Solutions
1 Perimeter Road
Manchester, N.H. 03103
(603) 627-9900

Imaging: The New Corporate Vision.



Imaging technology is revolutionizing the way companies control and use information. Today's imaging systems allow businesses to convert paper documents into digital images that they can store, index, display and print electronically. The results are faster work processes, reduced labor costs, and improved responsiveness to customers and market opportunities.

Imaging Expo is the most comprehensive look at electronic image management products, systems, subsystems and services, and is your best opportunity this year to discover the strategic value of imaging technology.

Benefits of Attending

- Find out how imaging can help you manage your office documents electronically
- Learn the key criteria to selecting imaging systems and subsystems
- Discover emerging imaging technologies

Who Should Attend Imaging Expo

If you manage a department, company, or are responsible for information systems, attend Imaging Expo for information vital to your task of maintaining a competitive edge in the 90's and beyond.

If you are an integrator, VAR, distributor or computer reseller, come to Imaging Expo to find out how to be part of the fastest growing market in the information systems industry.

The Imaging Expo Conference.

Whether you're new to imaging or you are an experienced imaging professional, you'll find a wealth of information at Imaging Expo. The Conference Program is designed to help imaging professionals at all stages of the learning curve, in two major conference components:

Understanding and Implementing Imaging Systems

- Technical Overview of Imaging Basics
- Imaging and Windows
- Imaging and Re-engineering
- Imaging Standards
- The Legality of Optical Disk
- Networking Imaging Systems
- Integrating with Existing Systems
- Imaging Moves to the Desktop
- Display Systems for Imaging Applications
- Distributor Trends and VAR Opportunities
- Image-Enabling PC Applications
- Developing a Corporate Imaging Strategy
- Integrating Workflow in a Corporate Environment

Advanced Imaging Technology

- Optical Storage: Fact and Fiction
- Color and Full Motion Video Compression
- Trends in OCR
- Image Management and Multimedia
- Image Communications
- Trends in Image Display
- A Distributed Approach to Image Processing
- Integrating Images and Databases
- Workflow Solutions
- Integrating Imaging with Internal Resources
- Output Solutions for Imaging Systems

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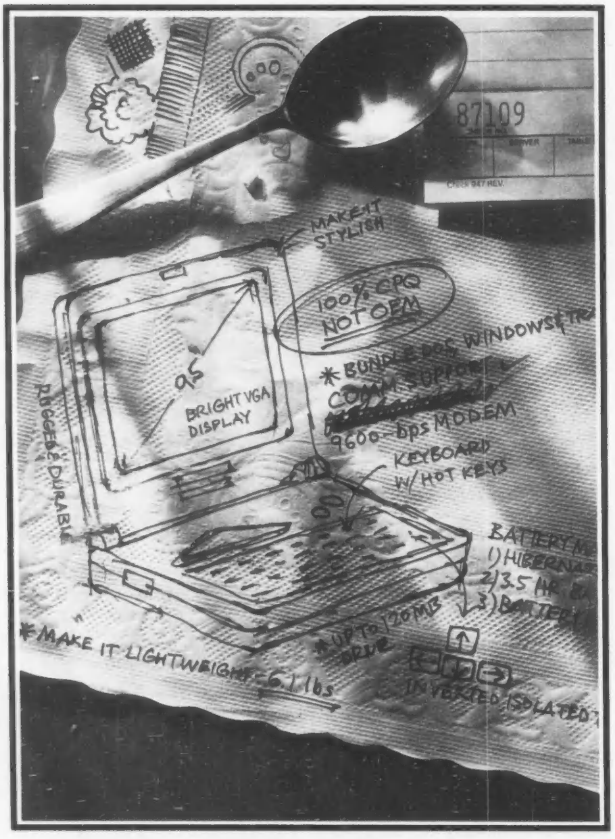
GUESS WHO FI

It wasn't easy. Changing a company our size never is. But we listened to our customers, we studied our competitors, we took a good, long look in the corporate mirror and did the only thing we know how to do. We rolled up our sleeves and went to work.



The result of all this work will begin appearing in the weeks to come.

That's when you'll see new prices, new customer service and support, new methods of distribution and, of course, new products from Compaq.

From inexpensive machines for the most basic computing needs to advanced products that stretch the envelope of computing technology at prices that our customers will find quite compelling and our competition will find, well, competitive.

What you won't see are stamped-out, second-rate boxes with the COMPAQ name stuck on at the end of somebody else's assembly line.

While that may be the way of the world, it's certainly not the COMPAQ way.

We still believe today what

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NALLY DID IT?

we have always believed.

That a PC's overall performance, compatibility, reliability, and ultimate affordability has a lot more to do with innovation than with imitation.

So instead of asking 1200 of the finest computer engineers in the world to forget their experience, forget their beliefs, forget everything they knew about building great computers, we chose to take a different approach. We asked them to take all that knowledge and ability and build great inexpensive computers.

Engineering to cost versus engineering at any cost.

And as the best engineers are wont to do, they saw this not as a limitation to their creativity and spirit, but rather, as a new kind of challenge. A new hurdle to overcome. A new problem to ponder, twist, push, pull and ultimately, to solve.

They questioned standard manufacturing techniques, they challenged all of our suppliers, they poked and prodded and turned every aspect of every process upside down, inside out and sideways until they had managed to shake out every unnecessary cost or component.

No more over-think.

No technology simply for the sake of technology.

And along the way to our new improved destination, we learned something that our most loyal customers probably knew all along.

We learned that what makes a COMPAQ PC more than just another computer isn't simply the engineering. Or component quality. Or design. Or testing.

It's not even more tangible qualities like our reputation for complete compatibility or near-zero defect production.

In the end, what makes a COMPAQ PC more than simply another computer can be summed up in a single word.

Passion.

The passion to push technology, the passion to recognize an idea whose time has come, the passion not just of those 1200 engineers, but of an entire company, to listen and learn and adapt to whatever the customer may want today while anticipating what they might need tomorrow.

In short, the passion to do things right for the customer.

To find out more about what the new Compaq has to offer, just call 1-800-345-1518, ext. 206 in the U.S., and in Canada, call 1-800-263-5868, ext. 206.

COMPAQ

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PC MAGAZINE EDITORS' CHOICE February 28, 1989 DCA IRMALAN for Windows Ver. 1.0

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SEE US AT PC EXPO '92 BOOTH # 3360

Unix takes charge at PageNet

Firm discards proprietary system for $5 million-plus Unix-based net

BY MARYFRAN JOHNSON
CW STAFF

PLANO, Texas — As the largest player in the highly competitive business of personal pagers and beepers, Paging Network, Inc. has a lot riding on providing its 1.7 million PageNet clients with top-notch customer service.

So when company officials decided that Unix-based open systems were the ticket to improving that service, they took the Texas approach and thought big: new hardware and software in a top-to-bottom overhaul costing more than $5 million.

PageNet is shedding its proprietary Datapoint Corp. systems for a network of about 40 Unix-based Motorola, Inc. servers and more than 1,100 X Window System terminals from Network Computing Devices, Inc.

The new machines run a largely homegrown database written in Microfocus Cobol and Asterx office software from Applix, Inc.

"We take pride in offering a quality service at the lowest cost, and that's one of the reasons we looked into new systems," said Reggie Rippetoe, director of special projects at PageNet. "Some paging companies also dabble in cellular [phone services], but we focus on paging alone."

"We don't see a lot of folks starting from scratch this way. In most cases, there's a lot of baggage from legacy systems," said Greg Smith, president of Advanta Technologies, Inc., the Houston-based systems integrator working with PageNet. "These guys are willing to cut the cord and say 'Let's do it right the first time.' "

Most of PageNet's 33 offices are located in the heavily populated East and West Coast regions, but the company is busy expanding into the central U.S. as well. By the time the conversion project — now one-third complete — is wrapped up next year, there may be as many as 50 or 60 branch offices, Rippetoe said.

"We knew we would spend a lot getting it all implemented, but in the long run the payback will justify it," he said. "We're already seeing some of that in offices with our new customer information services system."

One major change for employees on the customer infor-

Continued on page 50

ON SITE

David Lawrence

Reggie Rippetoe, director of special projects

Paging Network, Inc.
Plano, Texas

- **Challenge:** Replace outdated proprietary minicomputers in an effort to improve customer service.
- **Technology:** 40 Unix-based Motorola servers and 1,100 X terminals.
- **Results:** Customer service improvements, such as the ability to answer customer questions on a customer's first call.

Compaq attacking server market with good intent

BY MICHAEL FITZGERALD
CW STAFF

HOUSTON — Compaq Computer Corp.'s Systems Division has been throwing a flurry of punches at rivals in the network server market, and network managers indicate that Compaq may just hit the mark.

The company discussed the heart of its strategy, the Insight Manager, which is a collection of tools designed to give network administrators better management capabilities, several weeks ago [CW, May 25]. However, Compaq did not officially unveil the product until June 8. It did so along with a reworked SystemPro, lower prices on some of today's SystemPros and a deal to bundle Novell, Inc.'s NetWare with its SystemPros.

Recent interviews with Compaq executives revealed that the company is also planning to dramatically change the way it services and supports SystemPro and networking products in general.

Cautious, but interested

Users said they will wait and see how Compaq implements the new strategy, but they have some interest in its plans.

"We've been turning to Compaq for support for some time — they've played in that game a long time," said Glenn Sandusky, chief information officer at Miller Mason & Dickenson, a subsidiary of Aon Corp. in Chicago. "I think they can pull it off."

"Compaq has an excellent technical hot line and a lot of areas they're very strong in," said Patty Houk, manager of local-area network systems planning at American President Lines Ltd. in Oakland, Calif. "If they can do it, I'd like to talk to them."

Houk said she found that problems with making all the pieces of a network fit together frequently turn into a finger-pointing free-for-all by vendors that makes successful integration tricky at best. A responsible single point of contact would limit such problems, she said.

Gary Stimac, senior vice president and general manager of Compaq's Systems Division, said these changes will come in part because Compaq thinks network sales will slow without significant additions of features and in part because information systems directors need relief.

"MIS departments have been given the charter to control a decentralized" computing environment, "and they want to reduce the amount of expertise they have in the field," Stimac said. Compaq intends to improve its support and service to do this. "We need to evolve ourselves . . . to be like the mainframe vendors of the '60s and '70s," Stimac explained.

"We'll be delivering hard-

Continued on page 54

$38 942 307 809
By the end of this week Computerworld readers will have spent over $38.9 Billion on Information Technology this year – representing nearly half of all IT spending to date in 1992.
COMPUTERWORLD
The Newspaper of IS
Source: IDG Research Services, Fall 1991

Unix in charge at PageNet

CONTINUED FROM PAGE 49

mation services system is their ability to perform multiple tasks through a windowed, graphical user interface based on the Open Software Foundation's Motif.

"This has opened up the productivity of the user," Rippetoe said. "Employees can now bring up more than one window to run word processing or E-mail, do queries into the paging system and have multiple customers up on billing."

Clients who call in to one of the 10 to 15 offices converted to the new system now stand a good chance of getting their questions answered while still on the line, rather than waiting for a call-back.

The decision to go with Motorola hardware was made without much notice of the competition. "We have a very good relationship with Motorola on the pager side of their business, and we are their largest customer for pagers," Rippetoe explained. "So it was kind of a natural fit."

> "WE KNEW WE would spend a lot getting it all implemented, but in the long run the payback will justify it."
>
> REGGIE RIPPETOE
> PAGENET

One challenge PageNet did face was finding Unix-based, integrated office software that would not prove daunting for the employees to master. The company settled on Asterx, a suite of applications and tools for creating, editing and sharing information across networks of X-based workstations.

A particular point for Applix was its Extension Language Facility (ELF), a macro scripting language that PageNet used to customize graphical front ends and templates for its office requirements.

One piece of software the project director wrote using ELF allows the Unix systems to tap into the paging network. Users at their X stations can transmit files to alphanumeric pager devices — just as they would send a fax or electronic mail.

"I've sent whole files and been able to have them read out on our alpha pagers," Rippetoe said. "We use this quite a bit in-house — for the dispatching systems, the help desk, sales reps in the field — and for communicating to our managers."

While PageNet is building a decentralized client/server network based on Transmission Control Protocol/Internet Protocol, it is also hanging on tight to centralized control over maintenance and user support. To handle remote support of the X stations, PageNet relies on Simple Network Management Protocol, a high-level standard protocol for network management, in a communications management package from Wollongong Group, Inc.

"We tried to make sure we could support our field offices from Plano and do all the diagnostics and troubleshooting from corporate," Rippetoe explained.

SunPro announces SPARCworks 2.0

BY MARYFRAN JOHNSON
CW STAFF

SunPro, a subsidiary of Sun Microsystems, Inc., last week announced a new version of its SPARCworks line of development tools and compilers, claiming it improves application performance by 8% to 12% over the current tool set.

The SPARCworks Professional 2.0 package also employs a new, flexible licensing scheme that enables tools and compilers to support different versions of the Solaris environment interchangeably. In other words, one license will cover both Solaris 1.0 and 2.0 environments. Solaris 2.0 is scheduled for general availability early next month.

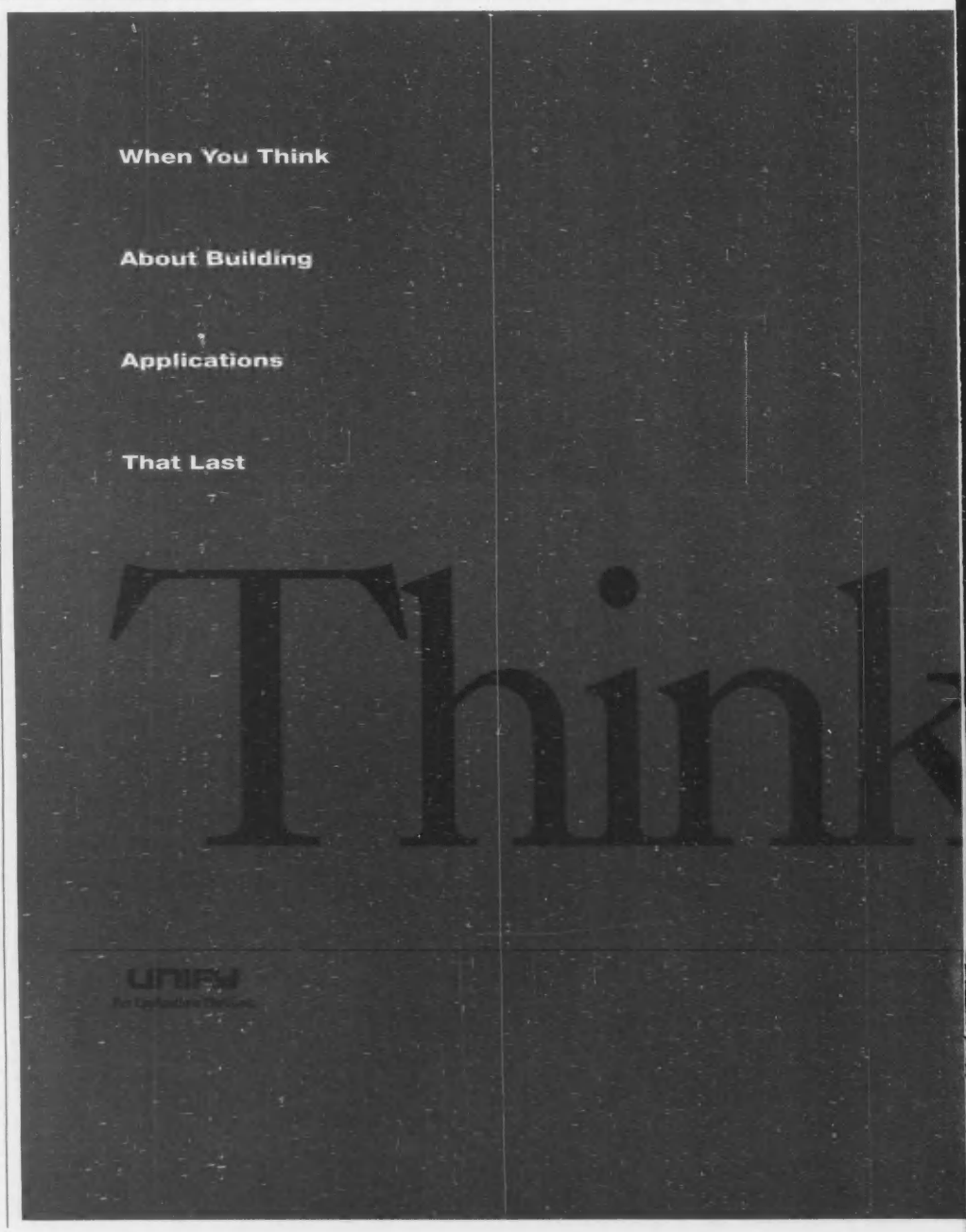
Supercompilers

SunPro's improved compilers for ANSI C, C++, Fortran and Pascal are now using advanced optimization techniques and parallel instruction scheduling, which a Sun spokesman said will enable developers to get the most out of the recently introduced SuperSPARC chips in the SPARCstation 10 line of workstations and servers. Those machines are scheduled to begin shipping later this summer and in the fall, according to the company.

With SPARCworks 2.0 available on both Solaris 1.0 and 2.0, users can sidestep the inconvenience of changing tool sets between platforms.

The enhanced tool set includes graphical browsers to help developers understand program structure more quickly, as well as debugger facilities, tool integration for sharing information among tools and an on-line AnswerBook document retrieval system.

According to SunPro, SPARCworks 2.0 will be available in September and prices will range from $1,595 to $2,195.



A silver lining for chore of tracking a Macintosh device

BY JIM NASH
CW STAFF

A recently released software package allows devices and groups of objects on an Apple Computer, Inc. network to be manipulated using the Macintosh "Chooser" utility in much the same way documents are managed.

The AG Group, Inc. said it is now shipping Silver Cloud, a Macintosh utility that the Walnut Creek, Calif.-based company said organizes Chooser lists into more manageable folders.

Among other tasks, the Chooser keeps track of all devices on a network. With Chooser, managers and users can access printers, servers and other machines on a Macintosh network. Beta-test users of Silver Cloud praised it but said they consider Silver Cloud a short-term alternative to Chooser and a possible replacement once Silver Cloud supports all the devices that Chooser does.

Silver Cloud lends a hand to both managers and end users. Managers can gather devices and groups of objects, known as zones, into logical folders. This makes it easier to find devices and zones without having to pore over sometimes lengthy resource lists.

In the same vein, Silver Cloud enables users to give aliases to resources the same way applications can be given pseudonyms through Apple's System 7.0 operating system Finder utility. Aliases usually are names that are more intuitive to users, and they remain the same if the resource's actual name changes. If, for example, a printer is renamed, a user would be oblivious to the change. The user would continue to call up the printer by his own alias.

Devices and zones can also be hidden or locked away from users, reducing confusion for users working in huge networks by showing only relevant resources.

"There's not a whole lot left you can do to the [Chooser utility]," said Mark Goldenberg, a engineer senior at Hughes Aircraft Co.'s Fullerton, Calif., ground systems group. The company's Macintosh network spans 380 zones with about 10,000 workstations. In fact, Goldenberg said, Silver Cloud brings System 7.0 features to System 6.0-based Macintoshes.

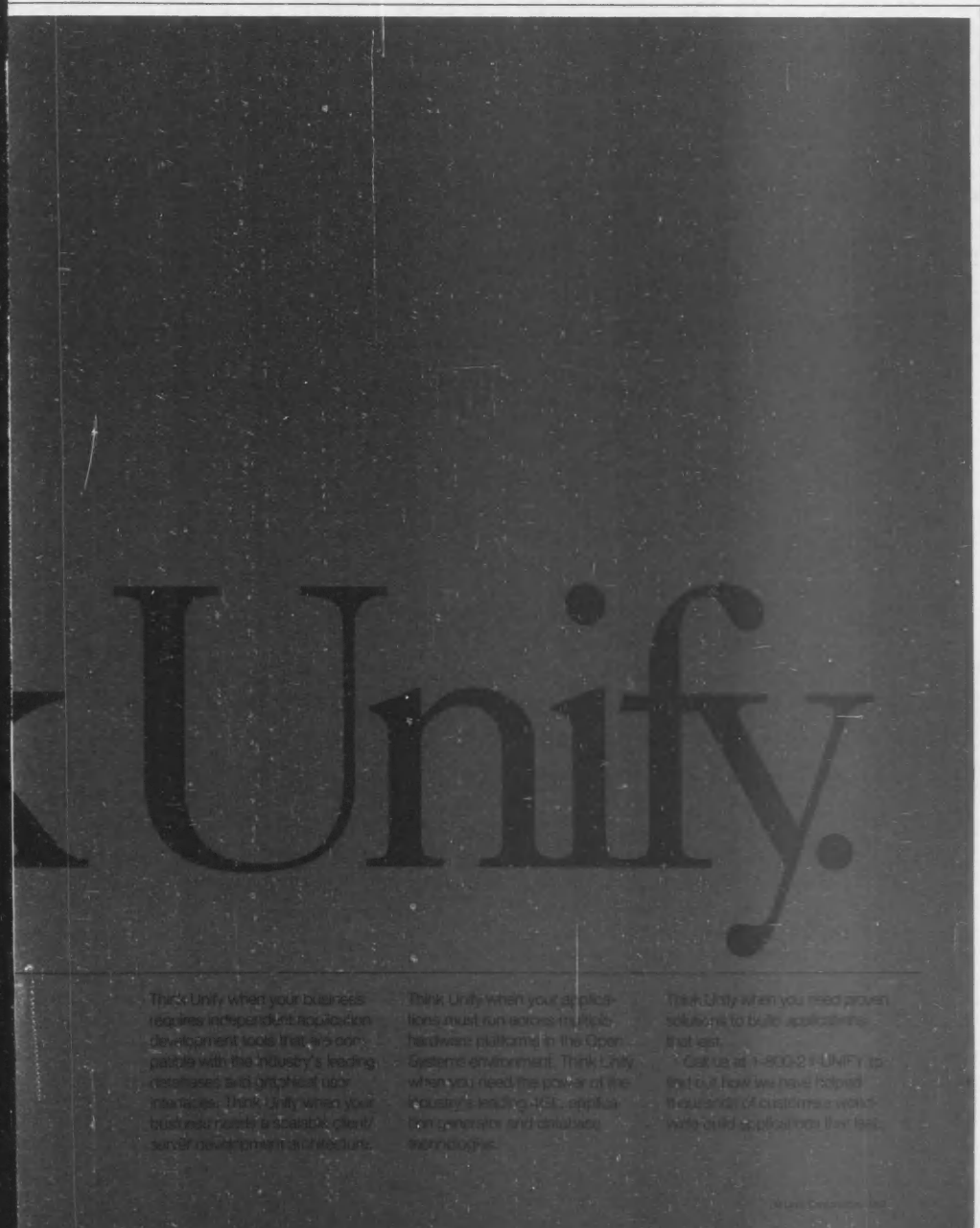
For example, Silver Cloud removes restrictions imposed by System 6.0 that limited Macintoshes to showing only 50 devices on a single list. It is difficult to see what is happening on large networks if only a limited number of machines can respond to queries at any time.

Under Silver Cloud, like System 7.0, all machines can be queried and listed in a single file and can be alphabetically sorted, Goldenberg said.

A network manager for a large aerospace manufacturer, who requested anonymity, said he is "fluent in System 7.0, and, as a manager, [Silver Cloud] has tools which help locate devices better." He said Chooser on System 6.0, with its constantly scrolling device list, "was a real problem" for big networks. His system has 280 zones.

One negative to Silver Cloud is that users can take a back door to circumvent the hide feature. Goldenberg said Apple's Chooser typically will remain on Macintosh hard disks. End users only have to call up Chooser to see objects hidden by Silver Cloud.

Chooser can be replaced outright, but as long as Silver Cloud is unable to recognize all the device drivers Chooser does, it will be necessary to keep both on most machines, Goldenberg said. He added that he is aware of a few drivers that are not supported as yet by Silver Cloud. Silver Cloud is priced from $495 for a 25-user license to $3,095 for a 250-user license.



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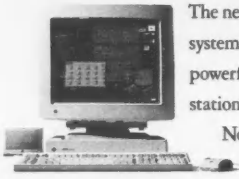

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Compaq attacks server market with good intent

CONTINUED FROM PAGE 49

ware systems from Compaq, software systems from Novell, applications from Oracle and . . . a whole range of companies, and someone needs to be the integrator for these," Stimac said.

Rod Schrock, Compaq's director of systems product marketing, said that only Compaq and IBM can handle the needs of users as networks grow more complex. "This stuff isn't even provided by IBM in a PC network environment, and it's nowhere near being provided by other PC vendors," Schrock said.

IBM recently announced several initiatives, notably a deal with Parallan Computer, Inc., to develop advanced network management software, slated to ship late in the fourth quarter. Compaq competitors such as AST Research, Inc. and Dell Computer Corp. have also stated their intentions to expand their offerings in this area.

The Insight Manager and the new SystemPro have several elements of Compaq's product strategy.

The new SystemPro features the Intelligent Drive Array Controller-2, a new version of Compaq's Intelligent Drive Array. It was designed to improve data throughput by using a faster processor, letting the network handle more data-intensive applications. Compaq claimed it can perform as much as 70% faster than today's SystemPro.

Prices were cut by up to 20% on some SystemPros and 21% on the SystemPro/LT. The price cuts came on versions of each line that use the 33-MHz Intel Corp. 486DX chip, or the 25/50-MHz DX2 clock-doubler. These made room for the new SystemPro 486/33e line, which will start at $11,799 with 8M bytes of random-access memory and no hard drives.

Compaq's Insight Manager server management tools, which currently work with Novell's NetWare Manager, will be expanded. The focus is on preventive fault-maintenance, so hard drives or memory can be replaced before they go bad, as well as easy integration of various operating environments and remote maintenance tools.

Stimac also said that Compaq will focus on developing the following three distinct server markets:

- Application servers targeted at Unix users or for the database or Lotus Development Corp.'s Notes.
- Connectivity servers that connect to other networks or to mainframes.
- Stand-alone LAN servers.

While some of its moves, such as bundling Novell's NetWare with its increased service and support, seem to damage Compaq's dealers, one dealer approved. "Preconfigured Novell would be a real smart move — I know a lot of corporate customers who would like that," said Pat M. Calabrese, an account representative at MicroAge Computer Centers, Inc. in Tampa, Fla.

As for the support initiative, "it's going to give the guy with bits and pieces from each vendor assurance that he can go to one source for support," Calabrese said.

IN BRIEF

Plummeting prices

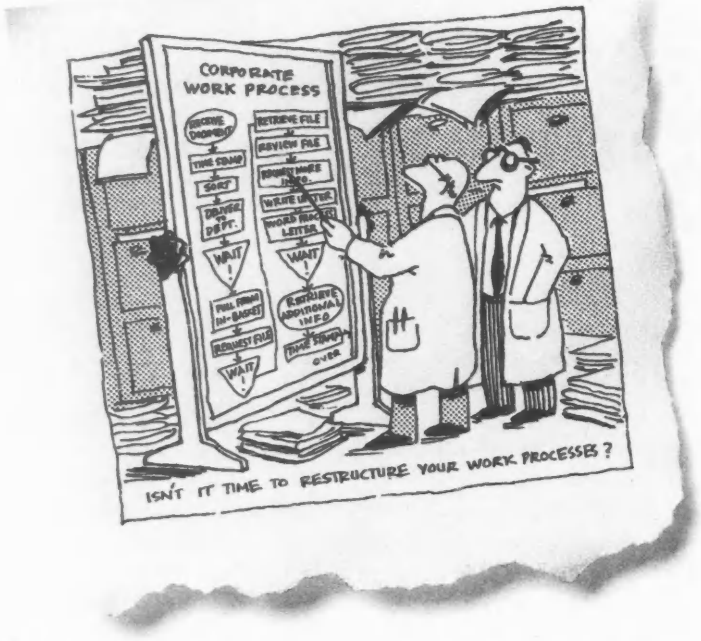
The following local networking vendors recently announced product price reductions:

■ **NCR Corp.** in Dayton, Ohio, has lowered the cost of its WaveLAN wireless network and initiated a summer promotion. For the next three months, the WaveLAN package will cost $695 and will then bump up to $799. These prices are down from WaveLAN's former retail price of $995.

■ Fiber Distribted Data Interface (FDDI) pioneer **Fibronics International, Inc.** in Hyannis, Mass., slashed prices of its bridges that connect Ethernet or Token Ring networks to FDDI networks and Ethernet-to-FDDI bridge/routers by 50%. Prices now range from $12,000 to $19,000.

■ Local data-switching innovator **Kalpana, Inc.** in Santa Clara, Calif., reduced the price of its 15-port local EtherSwitch by nearly one-third to $13,500, or $900 per port. EtherSwitch devices allow simultaneous 10M bit/sec. data "conversations" on an Ethernet, which is usually slowed by its shared-medium structure and contention-based access scheme.

■ **Xylogics, Inc.** in Burlington, Mass., cut the U.S. list price of its eight-port Micro Annex ELS terminal server from $1,895 to $1,595 and its 16-port model from $2,495 to $1,995. The products link terminals, modems, printers and other serial devices to Ethernet networks.



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Hughes downsizing adds up to savings

Aerospace firm slashes costs by abandoning mainframe in favor of more user-friendly PCs

BY THOMAS HOFFMAN
CW STAFF

EL SEGUNDO, Calif. — For years, Hughes Aircraft Co. has been running a slew of different applications on one of its IBM 4381 mainframe computers.

Like most businesses throughout the country, however, Hughes has slowly been moving many of its mission-critical applications off of mainframes and onto personal computers or workstations. So it came as no surprise when Hughes' Technical Services Division decided to abandon the 4381 in favor of PCs. The PC applications have proved to be more user-friendly and less expensive.

One of the last applications that was migrated from the 4381 world to an IBM PC-compatible environment was Hughes' library system, which is based on the CA-IDMS database management system from Computer Associates International, Inc. The library application tracks documents across varied systems and was required by Hughes even after the mainframe was shut down in February.

When the company decided last summer to abandon the mainframe, it was also faced with a management-established window of only six months to migrate its CA-IDMS applications to another platform, according to Lynn Sosa, a technician at Hughes.

Fortunately for Hughes, CA has a PC version of CA-IDMS, aptly named CA-IDMS/PC. Since Hughes was under a time-frame constraint to migrate the application as quickly as possible, CA-IDMS/PC fit the bill. "There were minimal conversion requirements, so we were able to migrate before the mainframe was abandoned," Sosa said. The conversion process, which began last September, was completed by mid-February.

The costs of running the IBM 4381 had simply become too high, Sosa said. The operating fees alone were costing Hughes $60,000 per month, while maintaining the five-user PC system costs less than $2,000 per month, according to Sosa.

The new system is based on a multiuser PC, a Dell Computer Corp. System 310. The CA-IDMS to CA-IDMS/PC conversion cost Hughes $65,000, so the cost savings on mainframe operations alone practically paid for the downsizing project after one month.

"We're not losing anything in response time, there are no access problems, and the disk backup is user-friendly, so I think users like [CA-IDMS/PC] even more [than the mainframe version]," Sosa said.

While the five users working with the application now utilize a multiuser PC, a networked implementation may be in the future, Sosa said. Hughes has considered using a Sun Microsystems, Inc. workstation as a platform, she added, but that was ruled out because Hughes wanted to stick with CA-IDMS, which wasn't available for Sun.

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DECnet tool gets boost

WESTBORO, Mass. — Proteon, Inc. last week announced that it has developed a new implementation of the company's DECnet Phase IV forwarder that allows more complete integration of IBM Token Ring and Digital Equipment Corp. environments, according to Proteon officials.

This implementation of DECnet is incorporated into Proteon's router software and allows the DECnet Phase IV protocol to operate over Source Routing bridges, which exist throughout IBM Token Ring networks, Proteon officials said. IBM Token Ring users will be able to continue using their Source Routing bridges and the addressing schemes.

DEC's DECnet-based Pathworks networking services are now better able to traverse existing 802.5 Token Ring networks, they added.

DECnet Phase IV end nodes and Proteon routers will also be able to cooperate in "discovery procedures," which determine locations of all end nodes on the network and the route by which packets of information find their destination.

This means that DECnet Phase IV end nodes can exist within Token Ring networks that are connected to Source Routing Bridges and, in conjunction with Proteon routers, will be able to send information to an appropriate end node on the Token Ring internetwork.

Proteon is also offering the ability for its CNX and 4100+ routers to set a Locally Administered Address to allow end nodes to run NetBIOS and DECnet concurrently. The new forwarder is available now from Proteon and is free to users with a maintenance license. Proteon's CNX and 4100+ routers start at $12,000 and $16,000, respectively.

MELINDA-CAROL BALLOU

White Paper

ELECTRONIC MAIL: THE NEW CORPORATE BACKBONE

"Electronic mail has delivered itself to the forefront of the corporate psyche. In many instances, it has become the preferred way of communicating within an enterprise. In fact, electronic mail will begin to make us redefine exactly what "The Enterprise" encompasses. It will play an integral role as U.S. companies increasingly change their automation focus from transactions to relationships among people."

This White Paper was written independently of the *Computerworld* editorial department by Ann Palermo, Director of Workgroup and Messaging Research, and Judy Rosall, Program Manager, Electronic Imaging, at International Data Corporation.
For more information on the content of this White Paper, or for information on International Data Corporation, please call 508-872-8200. For more information on the White Paper Program, please call 508-879-0700.

Introduction

In the world of corporate communications, electronic mail is doing for data what the telephone did for the spoken word: providing a ubiquitous communication media that allows anybody on the network to communicate with anybody else on that same network. Without the threat of busy signals.

But far more than just providing personal communication, electronic mail is turning into the backbone for a host of enhanced communications services that will greatly alter the way corporations and other organizations conduct their internal and external business. For instance, voicemail and facsimile transmissions are piggybacking on electronic mail networks.

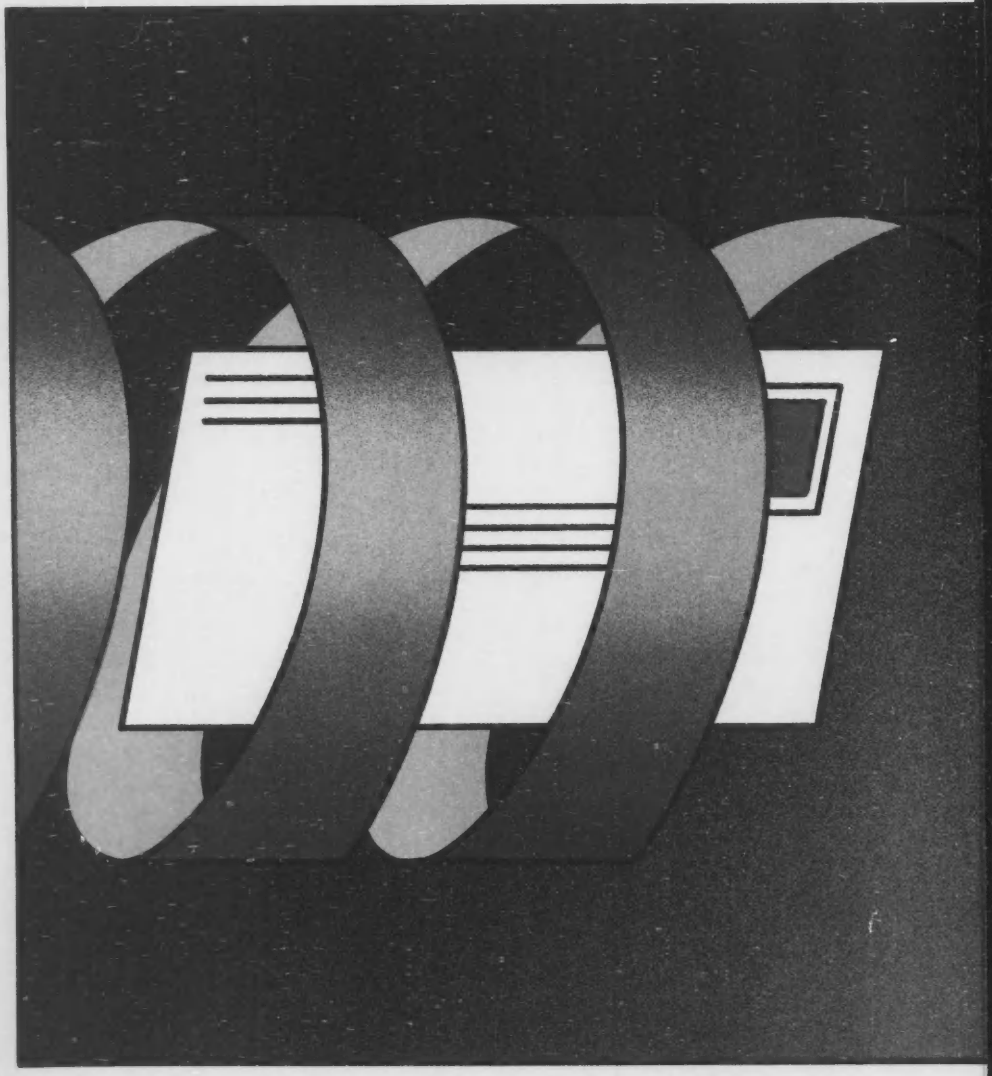
Further, innovative group applications such as workflow and routing, scheduling and electronic conferencing are using selected electronic mail system components such as directory services and transport capabilities. While this White Paper will discuss many of these topics, it will focus on electronic mail-enabling, applications-integration issues.

In addition to enabling enhanced services, electronic mail is supporting such business-altering trends as total quality management, reengineering and top line management. The impact of all these services and capabilities is nothing less than staggering.

The future of electronic mail will be greatly impacted by its adherence to the X.400 electronic mail transport and X.500 directory standards. As with most standards, these two are going through an evolution of acceptance within the vendor and user community. Eventually, they may play a key role in making electronic mail a truly pervasive user tool instead of a simple vendor-dependent add-on.

Despite its alluring promise, however, electronic mail still has some barriers to overcome. Unfriendly interfaces continue to put off potential users, and it is only slowly being integrated with applications in the all important local area network environment.

As these technology barriers inevitably fall, electronic mail will prove its value by automating relationships and the roles of people, rather than transactions.



ELECTRONIC MAIL: THE NEW CORPORATE BACKBONE

ELECTRONIC MAIL HAS DELIVERED ITSELF TO THE FOREFRONT OF THE CORPORATE PSYCHE. IN MANY INSTANCES, IT HAS BECOME THE PREFERRED WAY OF COMMUNICATING WITHIN AN ENTERPRISE. IN FACT, ELECTRONIC MAIL WILL BEGIN TO MAKE US REDEFINE EXACTLY WHAT "THE ENTERPRISE" ENCOMPASSES. ■ THE GROWING POPULARITY OF ELECTRONIC MAIL IS EVIDENCED BY SOME COMPELLING FACTS. THE NUMBER OF LOCAL-AREA-NETWORK-BASED ELECTRONIC MAILBOXES DOUBLED FROM THE END OF 1989 TO THE END OF 1990, DOUBLED AGAIN FROM THE END OF 1990 TO THE END OF 1991, AND WILL LIKELY DOUBLE AGAIN THIS YEAR. MOREOVER, FROM 1990 TO 1995, THE NUMBER OF LAN-BASED ELECTRONIC MAILBOXES WILL INCREASE BY AN ORDER OF MAGNITUDE. BUT THESE FACTS TELL ONLY PART OF THE STORY. ■ ELECTRONIC MAIL WILL PLAY AN INTEGRAL ROLE AS U.S. COMPANIES INCREASINGLY CHANGE THEIR AUTOMATION FOCUS FROM TRANSACTIONS TO RELATIONSHIPS

among people. In so doing, it will extend beyond the traditional concept of interpersonal messaging to include the automation of manual processes and the activation of desktop applications.

But before delving into the future of electronic mail, it is worth taking a look at how it got to where it is today.

THE GROWTH OF ELECTRONIC MAIL

The roots of electronic mail in a commercial office environment can be traced back to the 1980s, when it was a proprietary part of such large vendors' automation packages as Digital's All-in-1, IBM's PROFS and Personal Services, and Wang Office.

Changes began to take place in the late 1980s, with the advent of low cost electronic mail delivered on PCs attached by local area networks. But as the much-ballyhooed "Year of the LAN" was announced again and again from 1988 through 1992, the results were unimpressive: Despite the many grandiose predictions, LANs were primarily used to share expensive peripherals, such as laser printers.

Because prices of peripherals are rapidly declining, the economics of LANs are also changing. Now that LANs are largely established and accepted, users are adding networked applications. The first significant networked application is electronic mail.

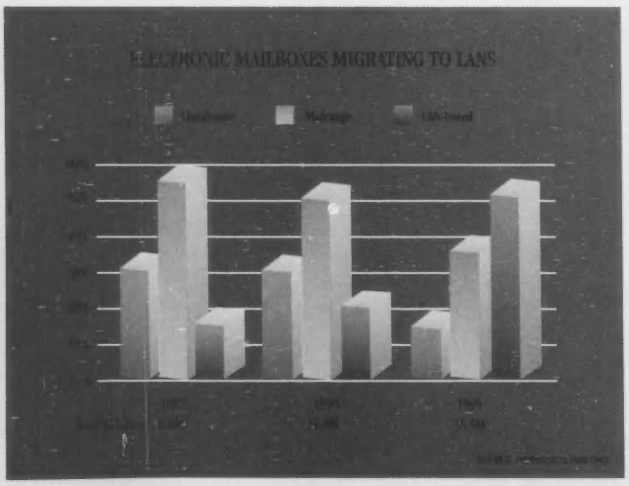
The rapidly burgeoning number of LAN-based electronic mailboxes is attributable not only to the upward growth in LAN-connected PCs — today over 40% of U.S. business's PCs are connected via local area networks, and that number is expected to grow rapidly over the next five years — but also to the recent trend towards downsizing applications. As a result of the booming LAN-based electronic mail popularity, minicomputer- and mainframe-based electronic mail systems are losing market share.

However, electronic mail is not without its problems. Many of its user interfaces are less than user friendly. Most electronic mail is text oriented and provides no inherent structure within the message. Electronic mail allows users to broadcast messages, but for instance, in workflow environments, there is no provision for automated routing of messages to a series of people. The integration of electronic mail with applications within the LAN environment has lagged. Finally, management issues including directory synchronization, multi-vendor integration and systems administration are growing as the number of electronic mailboxes grows. Both vendors and users alike are currently grappling with these issues.

Despite these shortcomings, there are some strong reasons why IDC believes electronic mail is not only here to stay, but will significantly change our corporate culture, becoming, in effect, the corporate information backbone. First and foremost is the growth rate of mailboxes. Total mailboxes numbered six million in 1987, but reached nearly 17 million in 1990. Second, electronic mail leverages existing investments in network technology, and unlike database management technology, it is inherently scalable.

Finally, there is an established set of international standards related to electronic mail transport (X.400) and directory services (X.500). These standards have increasing levels of support within vendor offerings, and clearly they have support from the user community (see sidebar), which will in turn drive the vendors to greater support. Ultimately, scalability, coupled with the X.400 and X.500 initiatives for transport and directory standards, will spell the difference in making electronic mail a truly pervasive business tool, as opposed to a simple vendor-dependent add-on.

This promising future of electronic mail is also predicated on some significant organizational trends that are currently occurring in the U.S., as well as ancillary developments in workflow software and intelligent mail filtering technology.



ARCHITECTURAL CHANGES

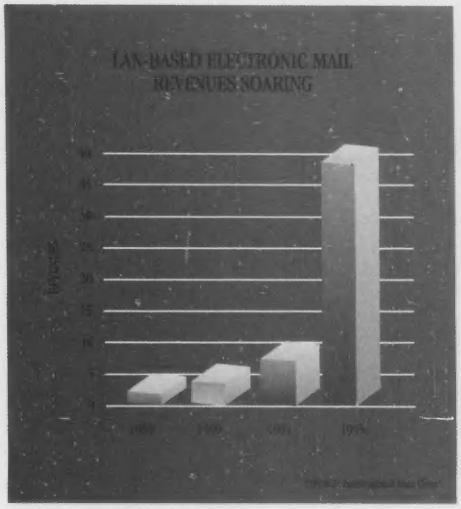
Typically the large-vendor, central, office-automation-based electronic mail systems of the 1980s were installed at sites where the predominant desktop device was a terminal. These systems of yesteryear are now ripe for conversion to LAN-based electronic mail packages, particularly in the many organizations that have replaced terminals with intelligent desktop devices.

For the companies placing processing power at the desktop, the appeal of host-based personal productivity applications is extremely limited. Over the past seven years, the trend towards replacing host-based applications with less expensive desktop applications, such as 1-2-3 and WordPerfect, has crystallized.

Further, as LAN-based electronic mail became available, its adoption within companies mirrored the personal productivity software trend. That is, just as host-

based word processing and spreadsheets were augmented and replaced by PC-based software, so did LAN-based electronic mail affect its host-based counterpart.

One compelling reason for this is the lower initial license cost of the software: PC LAN-based electronic mail user costs are approximately $50 per mailbox, which is a fraction of the cost of the host-based equivalent. Finally, as PC LANs grew up in organizations, out of workgroup, departmental, or other grass roots efforts, there was a void in terms of interpersonal communication that was readily filled by LAN-based electronic mail.



Until early 1991 even the major PC software vendors had only a limited investment in electronic mail. In recognition of the growing demand, however, they are now delivering LAN-based electronic mail for a wide audience while offering lower prices and more appealing user interfaces.

As the new electronic mail systems evolve, like the previous generation of office automation systems, they too will include other applications. Rather than providing personal productivity applications, which are now commodities on PCs, electronic mail will evolve to support networked and group applications, such as workflow and routing, scheduling and electronic conferencing.

Even though these applications are a step beyond electronic mail because they are focused on collaborative activities, in many cases electronic mail will still provide the infrastructure required to run them. For example, many group computing applications will use selected electronic mail system services such as address book and transport.

Electronic mail architecture is shifting toward a modular, client-server foundation as PC-LANs supplant host-based systems. On the client front, the key function is performed by the user interface. Because of the variety of desktop devices in the office, companies frequently have a need to support varied devices in a single electronic mail network. Also, users want to customize their electronic mail environment to suit their individual needs. This includes having easy-to-use programming and electronic mail filtering systems that discriminate among calls and treat them in a set way.

On the server side, three electronic mail components are becoming increasingly modularized: the directory, the message store and the transport. The directory, or address book, minimally holds information on users' addresses. This is expanding, however, to include information further profiling the user's work preferences, such as his or her preferred word processor or spreadsheet. As a result, when application-based information is mailed, it can be translated into the most useable format for the recipient. The message store is the repository for the actual message files, and the transport routes the transmission.

The server will increasingly provide more sophisticated services as electronic mail becomes more widely implemented. For example, network-based electronic mail rules servers will function as filtering systems for all the electronic mail in the system. Much to the relief of users, there may be a time in the not too distant future when such a system will be used to weed out the electronic junk mail.

ORGANIZATIONAL TRENDS

There are a number of factors contributing to the pervasive need for more and better kinds of interpersonal electronic communications within and among businesses and organizations. This is happening as the enterprise goes through fundamental changes.

Total Quality Management

The concepts of total quality management and quality circles are rapidly moving from the largest, most successful corporations to smaller organizations. American companies of all sizes are such enthusiastic fans of quality management that prestigious awards, such as the Baldridge, are now based on quality. The fact that few companies spend any time defining quality does not prevent them from dedicating themselves wholeheartedly to quality circles.

Reengineering

Reengineering is a set of methodologies aimed at streamlining the business process. Its goals are to create significant improvements in throughput as well as provide improved tools for management feedback. The term is somewhat ironic as most business processes were never engineered in the first place. Reengineering works best when it is implemented in an environment involving all levels of employees. Perhaps the biggest advantage of reengineering is that its promise makes it easier for businesses to admit that they need to change. Again, electronic mail can be a key enabler by opening up and maintaining communication during this critical process. Like reengineering itself, electronic mail breaks down the barriers between departments.

Top Line Management

The bottom line management style of the 1980s focused on corporate profitability. This approach focused more on earnings per share than customer satisfaction. The 1990s will show a dramatic shift towards top line management, wherein companies take a longer term approach

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Users embracing E-mail, standalone fax, voicemail

The annual IDC multi-media and integrated messaging end-user survey of 100 Fortune 500 U.S. corporations reveals significant shifts over the past year in messaging priorities along with substantial growth in corporate usage and intent to purchase electronic messaging technologies.

According to the survey, electronic mail, standalone facsimile and voicemail are becoming nearly as ubiquitous as the telephone. Furthermore, activities such as the deployment of LAN-based electronic mail and increased emphasis on the interconnection and integration of electronic mail systems, PC fax boards, X.400/X.500-based products, messaging Application Program Interfaces (APIs), on-line information services and EDI technologies are all given a high priority by the survey respondents.

These shifting priorities reveal that electronic mail in the corporate environment is moving beyond its traditional role as an interpersonal communications vehicle. It is becoming a universal platform for a wide variety of multi-media and integrated messaging applications. Interim corporate electronic mail strategies are giving way to strategies designed for the longer term.

"The purpose of electronic mail is becoming clearer as it evolves into a foundation for building enterprise-wide, integrated multi-mode messaging highways."

Acquiring a Critical Mass of Users

The purpose of electronic mail is becoming clearer as it evolves into a foundation for building enterprise-wide, integrated multi-mode messaging highways. The prerequisite for implementing these highways is a critical mass of interconnected users and the installation of a ubiquitous, integrated messaging transport platform. This explains the strong emphasis on interconnection, integration and open systems deployment by the end users in this survey.

Look for the coming year to bring increased end-user emphasis on purchasing and deployment of Open Systems Interconnect (OSI) compliant X.400 and X.500 products and services. There will also be more emphasis on the integration of fax and electronic mail and voicemail and electronic mail. Other trends to look for include increased support and development of messaging APIs; continued growth of LAN-based electronic mail system implementations; and the beginnings of workgroup and document management system deployment.

Respondents are surprisingly consistent and clear when identifying emerging trends in electronic messaging. The need for integration of various electronic messaging technologies appears repeatedly as a key theme and end-user requirement, particularly the intra- and inter-enterprise integration of electronic mail systems. And they reveal preferences for particular integration scenarios and standards (internal electronic mail standardization and industry electronic messaging standards).

This year's report shows rapid growth in the penetration rates of electronic messaging technologies. The following items reflect the current percentage of use and the comparable figure from one year ago:

- Electronic mail penetration (98%, up from 67% last year)
- Voicemail penetration (84%, up from 48% last year)
- LAN-based electronic messaging penetration (65%, up from 50% last year)
- EDI penetration, (42%, up from 28% last year)
- Fax boards, (49%, up from 15% last year)
- LAN or host fax servers/gateways (52%, up from 17% last year).

Specific integrated hardware scenarios indicate increased user sophistication resulting from early adoption. More than half of the survey respondents give high importance to integration of the following messaging media:

- Access a "universal mailbox" from anywhere (65%)
- Integrate graphics/images into electronic mail (58%)
- Be notified in electronic mail of fax receipt (58%)
- Retrieve messages in any format from electronic mail (62%)
- Be notified in electronic mail of voicemail receipt (54%)
- Integrate fax graphics into electronic mail (54%).

Market Sophistication Drives Use

It is also important to compare this year's responses to last year's. Sixty-five percent of this year's respondents indicate the importance of the universal mailbox, up from 40% last year. This is evidence of major advances in market sophistication. Fifty-six percent of this year's respondents indicate the importance of retrieving messages in any form from electronic mail, up from 35% last year. This reflects the gains in penetration electronic mail has realized.

Among end users, OSI-compliant products are mentioned as the most popular means of providing integration. X.400- and X.500-compliant products are strongly favored by system implementors and those who influence purchasing decisions. Approximately 42% of the respondents indicate planned deployment of X.400 interconnections during the next two years. The importance of X.400 compliance in electronic mail systems is cited by 53% of respondents, up from 26% last year.

Interestingly, 38% of the respondents indicate they will be implementing X.500 applications within the next two years. IDC believes this response reflects a willingness on the part of corporations to begin deployment of strategic plans that will include internal and external international OSI intercon-

nection capabilities. This response also portends gradual migration from proprietary, or tactical, electronic mail gateways to open systems protocols.

Purchasing intentions for all forms of electronic messaging products and services continue to be strong. For internal use, facsimile-related technologies are most often mentioned, with bigger ticket purchases of voicemail and EDI also showing a significant response rate.

For external use, 31% of the respondents say they are planning to purchase electronic mail switching and gateway services within the next year. An additional 14% are planning to purchase these services (e.g., X.400, Message Handling Services, SoftSwitch, or LAN gateways) within the next two years. This response supports the premise that end users are continuing to emphasize the interconnection of electronic messaging systems (via proprietary and open systems protocols) to their electronic mail backbone networks.

Burgeoning Fax Derivations

Although fax technology is reported to be ubiquitous, significant growth continues in related technologies such as multi-function fax machines, LAN- or host-based fax servers/gateways, fax boards and fax/modem boards. Standalone fax machine purchases within the next year are predicted by 48% of the respondents and fax server purchases are planned by 35%.

Fax and fax broadcast services are also popular with the respondents, as 43% say they subscribe to various types of enhanced fax services. This market is poised for continued growth in areas such as fax broadcast, fax mailboxes and fax-on-demand. These services are helping companies realize improvements in marketing and customer service. Enhanced fax services are also positioned to move into the residential markets, as fax machines become a low-cost commodity like the telephone, VCR and television.

"According to survey respondents, the need for integrating electronic mail with other key applications is becoming an increasingly important priority."

Integration Need Cited

According to survey respondents, the need for integrating electronic mail with other key applications is becoming an increasingly important priority. The focus of electronic mail is now shifting to include more structured, application-specific activities and expanding to include a broader range of applications and enterprise-wide services. IDC believes that end users are looking to integrate electronic mail function within their specific application types, and as a result, they place strategic importance on products and services that will be able to provide this capability.

The number of voicemail systems installed at surveyed sites is up 75% from last year. This indicates an increased reliance on voicemail as an internal/external messaging device. Interestingly, voicemail is growing faster than electronic mail, which itself is up a healthy 46% from last year. Overall, electronic mail and standalone fax machines still maintain higher penetration rates than voicemail. IDC believes, based on reported 1992 purchase intentions, that by 1993, the penetration rate of voicemail will equal that of both electronic mail and fax machines.

There are many architectural issues to consider when implementing integrated electronic messaging, particularly modular, multivendor client/server-based messaging systems. The high growth of desktop platforms and their impact on communications has given them a significant bearing on LAN-based electronic messaging and groupware application purchasing dynamics. Respondents relate how much importance they place on the support of various desktop platforms. The four desktop platforms surveyed are:

- Microsoft Windows
- OS/2 Presentation Manager
- UNIX
- Macintosh.

By far, the platform that leads in importance is Microsoft Windows, which is considered important by 57% of the respondents, and unimportant by 23%. This shows that its importance has roughly doubled in the last year, when 27% of the respondents viewed it as important. OS/2 Presentation Manager support, UNIX-client support and Macintosh client support all fare significantly less well than Windows in users' views of importance. In all three cases, more respondents view them as unimportant (61%, 52% and 55%, respectively) than important (22%, 24% and 30%, respectively). Despite these less than favorable numbers, IDC acknowledges that OS/2, UNIX and Macintosh all have loyal, albeit smaller, followings, which represent additional market opportunity. We expect developers with sufficient resources to support multiple platforms, and therefore, to develop on these platforms secondarily.

Major Trends

Without being prompted with choices, respondents identified their view of the major purchasing trend in electronic messaging in the coming year. Grouping the responses into major categories according to frequency of their occurrence shows three major purchasing trends:

- Purchase Trend I — Emphasis on X.400 and X.500 products and services.
- Purchase Trend II — Emphasis on products that can integrate various messaging technologies.
- Purchase Trend III — Growth of the LAN-centric electronic mail environment and LAN-based electronic mail solutions.

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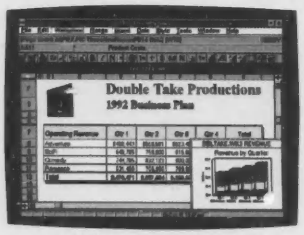

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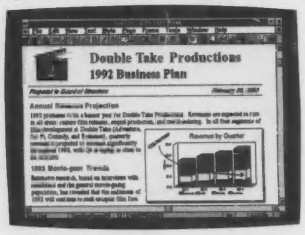

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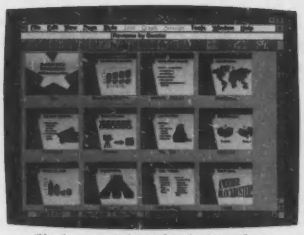

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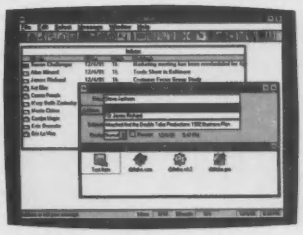

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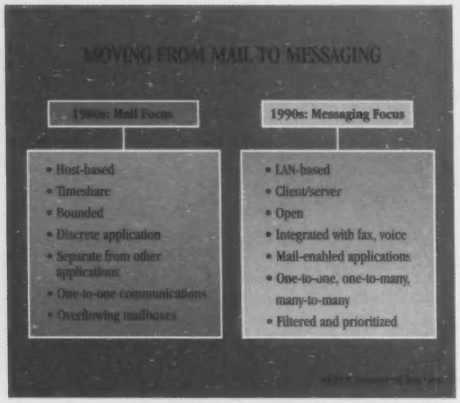
to business that includes an emphasis on quality and employee participation. As part of this process, companies will increasingly purchase only essential technology products and services. Electronic mail is one of these essentials.

Flattening of Organizations

Progressive companies no longer take a top-down approach to running their businesses. Active involvement by even the most senior management with the rank and file is becoming more common. At the same time, organizations are shedding management layers and adding more matrix organizations. This combination of factors has set the stage for a significantly wider use of electronic mail. In fact, it is not unusual for CEOs of billion-dollar companies to be regularly and actively involved in electronic mail-based conversations.



APPLICATION FOCUS

In order for electronic mail to realize its full potential, it must be accessible not only from a discrete electronic mail application, but from whatever application a user happens to be in. Typically, the concept of electronic mail enabling is associated with PC-based application software, but host- and workstation-based applications can also be enabled.

From a user's point of view, an electronic mail-enabled application would treat mail like a utility — such as a spell checker or printer driver — within the application. The fact that at minimum the message will need to travel over a LAN or even a WAN need not be known by the user. The capability should be seamlessly included within the desktop environment's native user interface. As such, electronic mail will appear as an entry on a pull-down menu in some environments, or a ring-menu in others.

In this form, electronic mail will be joined by other messaging technologies such as fax and voice transmission.

As electronic mail-enabling of applications becomes more prevalent, which IDC believes will be the case within the next two years, electronic mail will become seamless, allowing files to be sent in their native applications.

Sending around spreadsheet files with formulae embedded, rather than in final print format, will streamline the way users work together, and will be essential for workflow automation and other workgroup applications.

The increased availability and sophistication of electronic mail application program interfaces (APIs) is enabling electronic mail as an embedded utility within applications.

As a result, each environment will have its own set of interfaces supporting more customized messaging capabilities, which will enable software developers to describe and tag in detail the message content. These new messaging capabilities differ from the generally accepted concepts of interpersonal electronic mail, expanding the concept of messaging to include groups, routing and filtered selection.

LAYERED ELECTRONIC MAIL APPLICATIONS

The electronic mail of the 1990s will offer far more than the person-to-person messaging that characterized its 1980s counterpart. There is talk now about a number of application types that use electronic mail as their foundation. Some of the applications are not new — for example, calendar and scheduling facilities. The advances in this area are really in the interconnect area, where they will be implemented across different mail systems.

Three new application types will have a great impact in the near future: conferencing, filtering and agent facilities, and most dramatically, workflow.

Electronic Mail and Workflow

An appropriate application focus for electronic mail must combine a number of elements. First it must recognize changing organizational structures. This will sound the death knell for host-based systems. Second, it must leverage the innate strengths of electronic mail while adequately compensating for its weaknesses.

Workflow automation will become one of the most significant electronic mail-based applications before 1995. As required, it will improve, or at least mask, some of the weaknesses of electronic mail, while maximizing its strengths.

But what is workflow software? This is how IDC defines workflow: "Workflow software is the tool or set of tools that empowers individuals and groups of individuals in both structured and unstructured work environments to automatically manage a series of recurrent or nonrecurrent events in a way that achieves the business objectives of the company. Simultaneously, workflow software should allow feedback to management ensuring it the opportunity and ability to extend or modify those business processes as the business environment changes."

Workflow software represents the largest shift in automation in the past 10 years. Its implications go far beyond imaging technology, transaction processing systems, document management or office system technology. In fact, workflow software will become so pervasive that, for many companies, it will become the front-end to all their strategic business processing applications.

Electronic mail will play a fundamental role in workflow automation by providing the infrastructure for transport of the work packages.

Simply laying a workflow capability on top of existing electronic mail packages brings a number of immediate benefits. It provides the ability to route forms, messages or other objects. It also pro-

vides a consistent user interface across multiple environments. Application connectivity can be provided assuming that the workflow environment is built using a user interface that inherently has a data exchange facility.

Conferencing Systems

Electronic conferencing systems are not new — in fact, Digital has been delivering a conferencing system called VAXnotes since the mid-1980s. What is new, however, is the wider availability of a more appropriate infrastructure — electronic mail — to support this application concept. Conferencing systems, sometimes called electronic bulletin boards, support many-to-many communications. A conference topic is chosen, and the bulletin board for writing or reading is accessible to all or designated members of the forum.

Electronic conferencing is somewhat equivalent to the concept of a company meeting, but has some striking advantages: it does not have to happen in real-time, or all at one location. Conferencing systems streamline some activities that necessarily occurred in serial format — a memo is sent, each individual responds to the author, the author summarizes and sends out another memo, etc. That series of steps can be compressed into the introduction of a new topic in a conferencing system.

Another advantage of conferencing systems is that they provide a history of interactions. Thus, they can quickly bring a new employee up to speed on particular topics, or provide a path to understanding group contributions to the resolution of a topic.

Filters and Agents

With the proliferation of electronic mailboxes, and the increasing use of electronic mail as a standard way of intra- and inter-company communications, electronic mail management has become an increasing concern. It is not unusual for employees in a company with an electronic mail culture to return from a week's vacation with literally hundreds of unread messages waiting.

Users are searching for automated ways of managing both incoming and outgoing mail, and mail filters or agents are one way to do so. A mail filter can intelligently discern, and act on, electronic mail messages.

So, for example, there is hope for the beleaguered user just back from vacation. Next time, that user can set up a filter that will keep watch over all incoming mail, and sort, delete, forward or respond to mail based on certain established rules. For example, all mail from a manager could be forwarded to the secretary for review and response. All mail from colleagues can be sent a reply that states the user is on vacation and will return next week. All mail from a mailing list can be automatically deleted.

The reach of filtering agents can extend beyond the individual's desktop for more centralized control of electronic mail systems. Server-based filtering can be set up to manage the mail system by executing some system-wide rules. For example, a server-based agent could be set up to automatically notify a user that his mailbox has more than 300 messages. Or similarly, a server-based agent can be set up to automatically delete all messages over three months old.

SUMMARY

Clearly, electronic mail still has some maturing to do, but it is better to contend with immature technology than it is to stand by obsolete alternatives. Most noticeably, functions such as directory synchronization, interoperability of host- and LAN-based systems are still outstanding issues. On the brighter side, electronic mail continues to receive a great deal of development resources and improvements are delivered month by month. It is critically important that electronic mail be permitted to evolve and be redefined even as the businesses and organizations it serves also redefine themselves.

It is also clear that electronic mail will be the foundation of a series of new applications, such as workflow software and conferencing systems, which are aimed at automating relationships and the roles of people, rather than just transactions. As a result, electronic mail will rightfully be known as the backbone of corporate change.

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Categories	Attributes
General Environment	• Routine, well-defined, time-sensitivity is not critical
Organizational Impact	• Limited
Organizational Change	• Simple streamlining
Senior Management	• Involvement not necessary
IS	• IS should be involved in determining which data structures should be saved and insulate the user and the developer (could be the same person) in many cases from this task
Operator	• Clerical workers
Baseline Functions	• Forms based, simple routing • Electronic mail based • Attach image to electronic mail packet • Offer option of using existing electronic mailbox or creating a second dedicated box • Support transport and directory standards (X.400, X.500) • Support for non-electronic steps • Simple user interface • Security
Integration	• Terminal emulation • Support common electronic mail environments
Futures	• Intelligent forms • Support for third party forms packages • GUI front-end to application development

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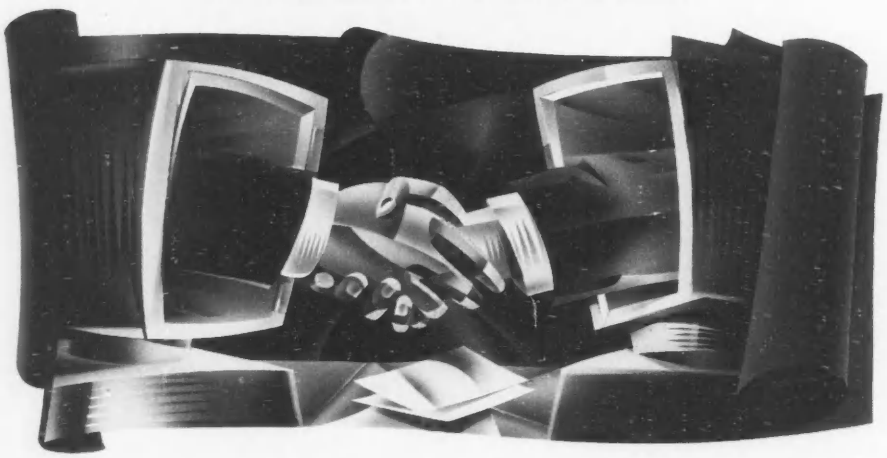

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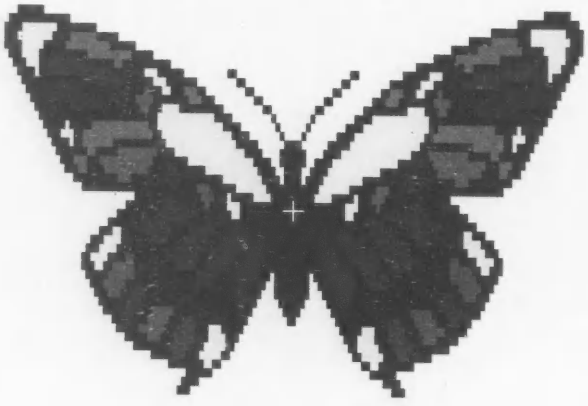

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NEW PRODUCTS

Electronic mail

ComputerHelp Resources, Inc. has announced Version 3.0 of "While you were out," a Microsoft Corp. Windows- and local-area network-compatible messaging system.

Networked users can send, receive, read, print and forward messages to other users. Version 3.0 features include automated installation, on-line documentation, message forwarding and the ability to sort and search for messages by key fields.

Prices for "While you were out" range from $99.95 to $4,995, depending on user versions.

ComputerHelp Resources
105-1005 Columbia St.
New Westminster, Canada
V3M 6H5

Worldtalk Corp. has announced the availability of Wordtalk 400 for Hewlett-Packard Co. HP 9000 systems.

Worldtalk 400 is a message integration server for local-area network electronic mail. The product connects E-mail applications, including Novell, Inc.'s Message Handling System, Lotus Development Corp.'s CC:Mail and Notes, and Microsoft Corp.'s Microsoft Mail, over an X.400 or Unix Simple Mail Transfer Protocol backbone.

Pricing on the HP 9000 platform begins at $23,950. Individual gateways cost $1,500 each.

Worldtalk
Suite 200
475 Alberto Way
Los Gatos, Calif. 95032
(408) 399-4080

Local-area networking software

4I Solutions, Inc. has introduced 4Site, host-independent software that integrates image processing functions with information systems applications.

4Site consists of an Application Enable Module and an Image Processing Module that operate on either a personal computer-based single-user or networked subsystem.

4Site can retrieve and display images, print them on the subsystem printer and fax images to other locations.

4Site costs approximately $20,000.

4I Solutions
22481 Aspan St.
Lake Forest, Calif. 92630
(714) 586-4445

SysKonnect, Inc. has introduced SK-Passport. The product was designed for personal computer networking.

Users can simultaneously and transparently connect to multiple servers such as Novell, Inc.'s NetWare, Microsoft Corp.'s LAN Manager and Unix. According to the company, SK-Passport provides a standard set of network interface drivers for all PCs on the network.

The single-user version costs $100 until Sept. 1, when it increases to $150.

SysKonnect
Suite D-1
12930 Saratoga Ave.
Saratoga, Calif. 95070
(408) 725-4658

Solid Computer Corp. has announced PCShare 1.2 network software.

According to the company, PCShare server software is up to 300% faster than the majority of network file servers. The software is compatible with DOS and Windows and offers simultaneous access to files from all personal computers and from Unix.

Configuration with PCShare permits all network services to run from a Unix computer using Transmission Control Protocol/Internet Protocol.

User license fees for PCShare 1.2 range from $39.50 to $9,720.

Solid Computer
Suite 300
1450 Oakbrook Drive
Norcross, Ga. 30093
(404) 416-6000

Unix

Samsung Software America has announced Replix, a Unix-based fax management software system.

Replix was designed to address organizations' communications application needs. Directly from a desktop, users can send, route, receive and view faxes. Replix incorporates an advanced graphical user interface that allows users to receive, preview and route faxes in a one-step process.

It can be fully integrated with other software products and is based on a true client/server architecture, the company reported.

The base package costs $2,395.

Samsung Software America
1 Corporate Drive
Andover, Mass. 01810
(508) 685-7200

MathSoft, Inc. has announced Unix Mathcad 3.1.

The software tool performs complex calculations and produces numerical or graphical results. New features include support for vectors and matrices of up to 8 million elements, color surface plots and a license manager for network installation.

The Unix version will be offered on six Unix platforms, including workstations from Sun Microsystems, Inc., Hewlett-Packard Co., IBM and Silicon Graphics, Inc.

The product costs $695 for a single network node or a stand-alone version.

MathSoft
201 Broadway
Cambridge, Mass. 02139
(617) 577-1017

Micro-to-micro

Boca Research, Inc. has expanded its multiport product line with the BocaBoard 2016, an interface product for serial devices.

BocaBoard 2016 is a 16-port board for XT/AT/Extended Industry Standard Architecture-based systems. Designed for use in the Unix/Xenix and multiuser DOS environments, BocaBoard is a high-speed, nonintelligent, multiport enhancement board.

The product allows the host personal computer system to become a multiport communica-

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tions system by connecting terminals, modems, serial printers and other shared devices.

The BocaBoard 2016 costs $595. For an additional $195, an optional connector box can be purchased that centralizes the connectors between the serial devices by consolidating all RS-232s in a single unit.

Boca Research
6413 Congress Ave.
Boca Raton, Fla. 33487
(407) 997-6227

Software applications packages

SBT Corp. has started shipping SBT Professional Series 2.0, an accounting system.

SBT Professional Series 2.0 offers an assortment of accounting software functions such as accounts payable, accounts receivable, general ledger and inventory control, and the system is linked with the current versions of SBT Fixed Assets and SBT Payroll. Full mouse support and pull-down menus are included.

The recommended workstation environment for Professional Series 2.0 is an IBM-compatible, Intel Corp. 80386 20-MHz-based system with 4M bytes of random-access memory running DOS 5.0 with NetBIOS or Novell, Inc. networks.

Professional Series 2.0 is priced at $1,295 per application.

SBT
1 Harbor Drive
Sausalito, Calif. 94965
(415) 331-9900

Local-area networking hardware

ASP Computer Products, Inc. has announced the ServerJet SI.

Using an RJ11 telephone-type cable, the ServerJet SI is a plug-in board that allows up to seven users to share a Hewlett-Packard Co. LaserJet IIISI printer without a local-area network. Six serial and one parallel port are included, and 1M byte to 4M bytes of buffer memory is available.

ServerJet SI pricing starts at $795.

ASP Computer Products
160 San Gabriel Drive
Sunnyvale, Calif. 94086
(408) 746-2965

Xyplex, Inc. has announced the 1450 Printer Server.

The 1450 allows Novell, Inc. NetWare, Digital Equipment Corp.'s VAX/VMS and Unix users to share the same printers on an Ethernet network. Through two parallel and two serial ports, up to four printers can connect to the back of the product.

Depending on the type of printer attached to the parallel ports, the 1450 offers throughput of up to 50K byte/sec., and the serial ports operate up to 38.4K bit/sec.

The 1450 is configured with 1M byte of random-access memory and can use available Single In-Line Memory Modules to upgrade to 3M bytes of memory.

The 1450 is priced at $2,195.

Xyplex
330 Codman Hill Road
Boxboro, Mass. 01719
(508) 264-9900

Lanco, Inc. has created the 320SE Ethernet workstation.

The plug-and-play workstation comes with software drivers for disk or network operating systems, including Microsoft Corp.'s LAN Manager, Banyan Systems, Inc. Vines, Digital Equipment Corp.'s DECnet, Transmission Control Protocol/Internet Protocol and others.

Connectivity is available for Ethernet 10Base2, 10Base5 and 10Base-T, with bidirectional parallel printer port and dual asynchronous serial I/O ports.

The 320SE Ethernet workstation is priced at $1,495.

Lanco
800 W. Airport Freeway 1100
Irving, Texas 75062
(214) 438-4955

Extended Systems Corp. has added two products to its Pocket Print Server network connectivity line.

The new models support 10Base2 Ethernet and nine-pin Token Ring connection. They can be installed on the parallel port of any printer and attached directly to a Novell, Inc. network.

Pocket Print Server uses Novell's standard print services that provide users with a direct network connection without having to learn new software. Novell NetWare 2.15 or later versions and NetWare 386 are supported.

The Pocket Print Server ranges in price from $495 to $995.

Extended Systems
6123 N. Meeker Ave.
Boise, Idaho 83704
(208) 322-7575

Chipcom Corp. has entered the Fiber Distributed Data Interface (FDDI) network market with FDDI modules for its ONline System Concentrator intelligent switching hub.

The product connects eight desktop workstations as well as servers, bridges, routers and other devices in a high-speed FDDI network. In addition, the intelligent hub allows users to plug FDDI modules into any available slot at any given time.

The ONline System Concentrator costs $13,500.

Chipcom
Southboro Office Park
118 Turnpike Road
Southboro, Mass. 01772
(508) 460-8900

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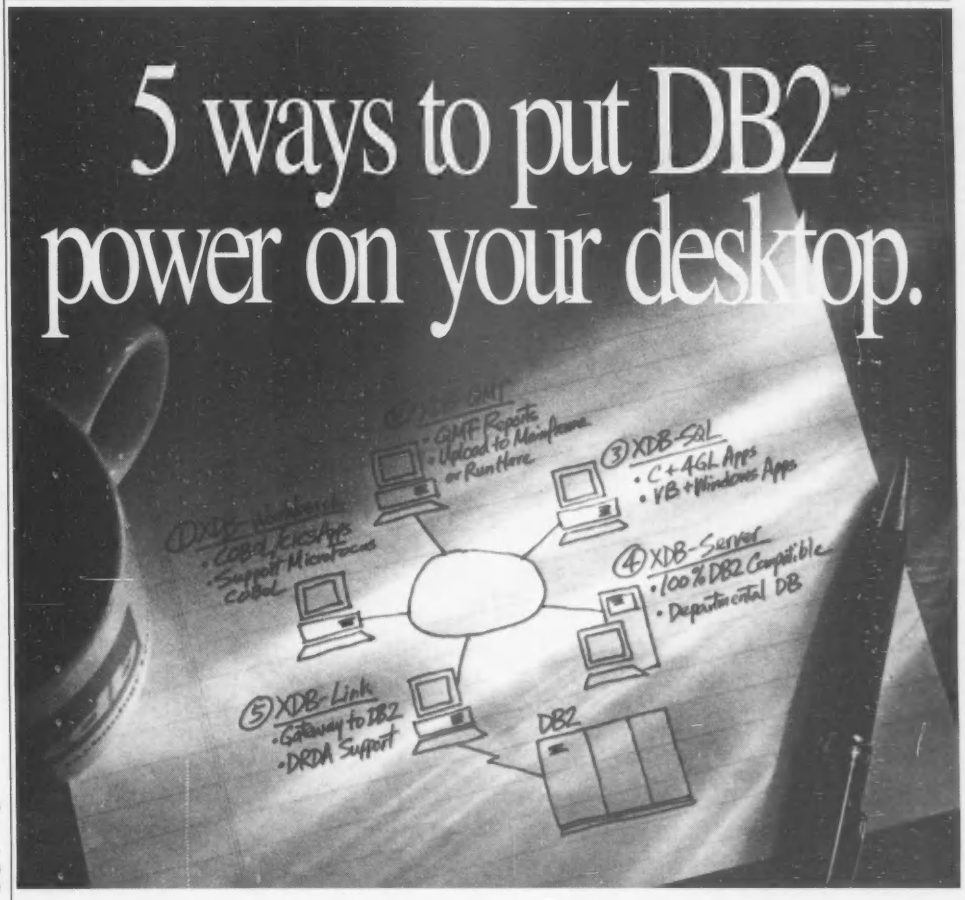

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301-317-6800 301-317-7701 (FAX)

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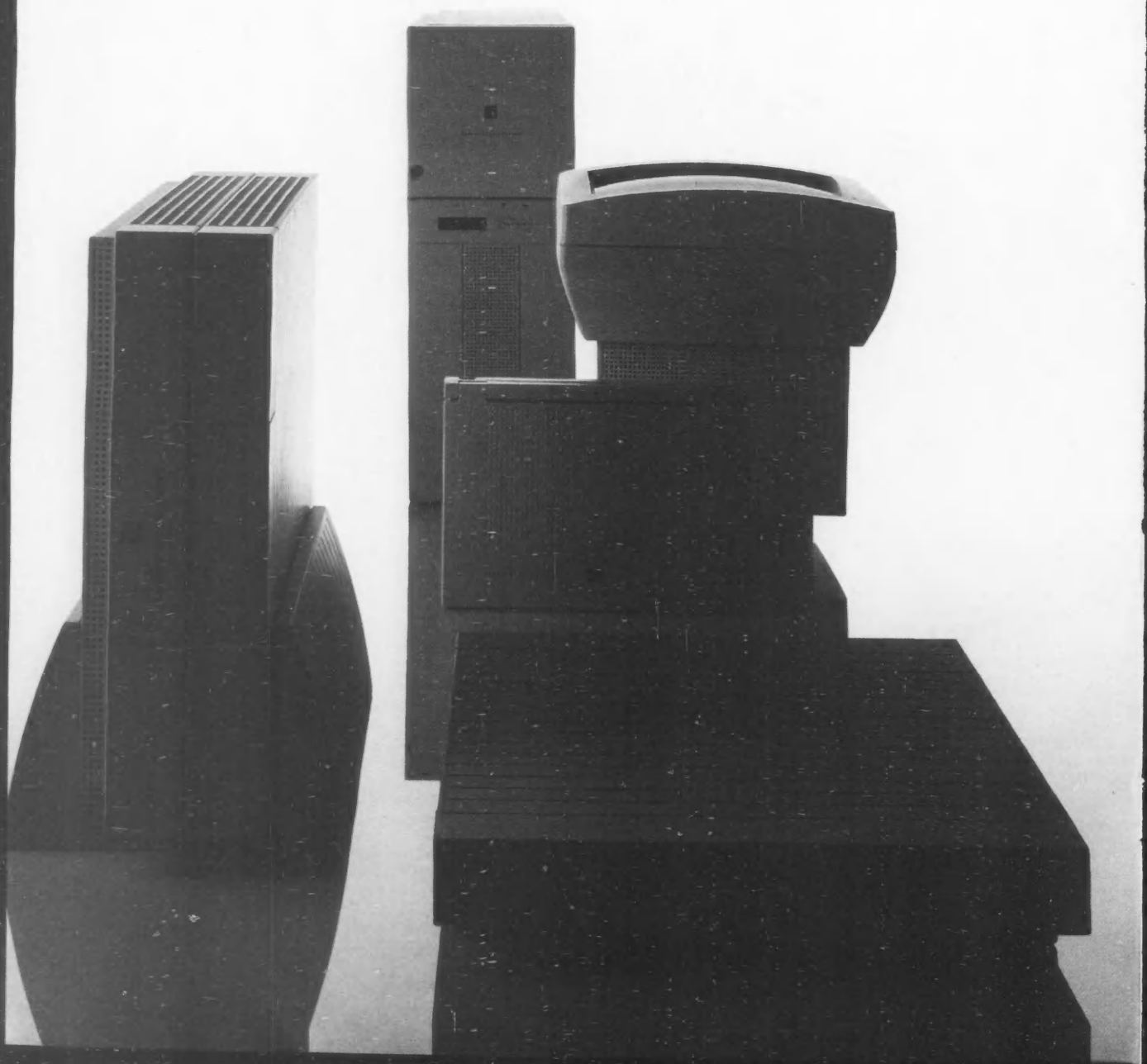

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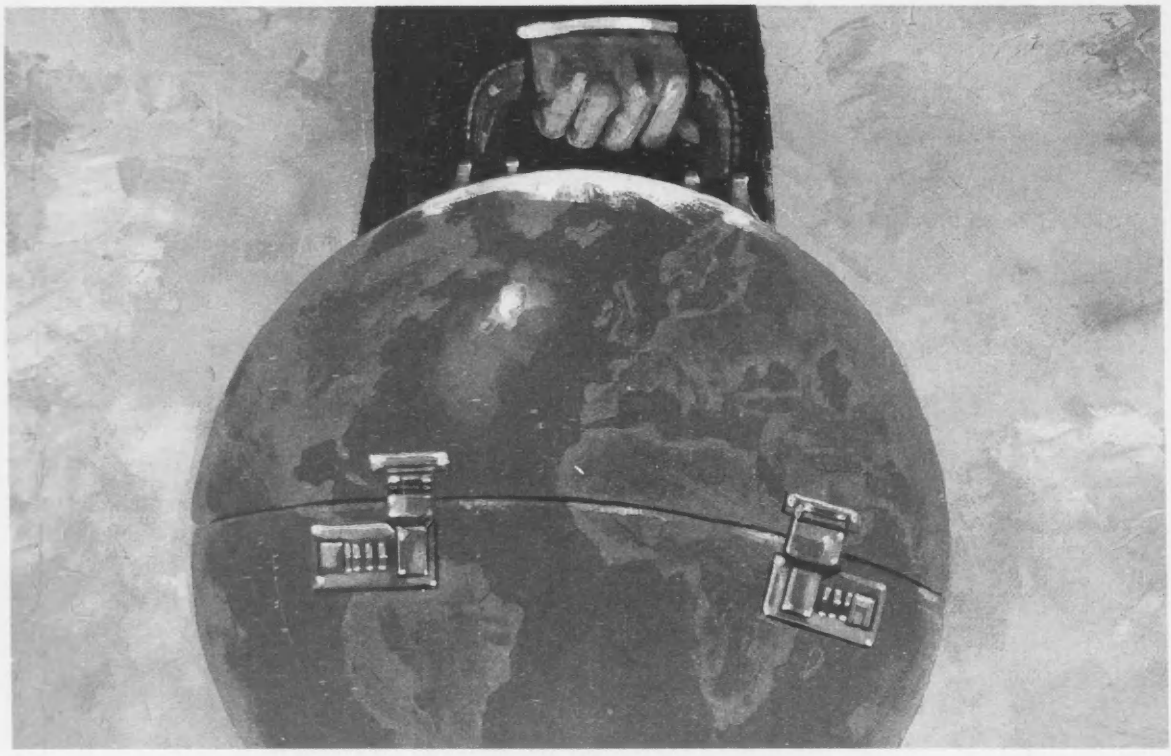

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Fault-tolerant LANs near takeoff for US Air users

Airport net reduces mainframe dependence

BY JOANIE M. WEXLER
CW STAFF

PITTSBURGH — An airport is one of those places where a fault-tolerant computing environment can really come in handy. Yet while many people think of fault tolerance primarily in terms of mainframe applications, US Air plans to shift such applications off isolated mainframes and onto distributed local-area networks at its new airport here.

The airline's collocated mainframes in Winston-Salem, N.C., are vulnerable because they house all corporate databases in one spot, said Ron Soulsby, senior systems engineer at the airline's headquarters in Arlington, Va. Dedicated links back to mainframes "occasionally suffer outages at inopportune times," halting airport-to-data center communications, he said.

"We decided the answer was to go to distributed processing to minimize our outages," Soulsby continued. "Then, if the mainframe links get cut with a backhoe or something, we continue to operate" using the server-mounted databases "and then update the central databases when communication is restored."

ON SITE

USAir

US Air
Pittsburgh

- **Challenge:** To maintain database access at new Pittsburgh airport even if communications to airline's Virginia headquarters are severed.
- **Technology:** FDDI backbone, OS/2-based servers and workstations.
- **Expected result:** Ability to replicate mainframe cycles five or six times on distributed network before reaching mainframe processing costs.

Heart of the matter

At the core of the distributed move is a $1.5 million redundant Fiber Distributed Data Interface (FDDI) backbone from Fibronics International, Inc. in Hyannis, Mass., that links multiple 16M bit/sec. Token Ring networks in each of three US Air terminals.

Both the need to protect corporate data and the influx of new applications (see story page 84) are driving the shift in network infrastructure, Soulsby said. He noted that FDDI technology was chosen primarily because of its fault-tolerant properties rather than for its 100M bit/sec. networking speeds — though the extra bandwidth provides breathing room for unknown applications sure to emerge in the future.

Because FDDI features two dual, counterrotating fiber rings, "the path in and the path out" of each Fibronics Token Ring-to-FDDI bridge "travel in diverse directions," Soulsby explained.

Soulsby said he conducted extensive interoperability testing

Continued on page 84

ATM edges toward proving self

High-speed FDDI protocol tailored for LAN and WAN environments

BY ELISABETH HORWITT
CW STAFF

Asynchronous Transfer Mode (ATM), the high-speed, fiber-based networking protocol, moved a few steps closer to commercial viability in both the wide- and local-area network environments with several recent vendor announcements.

Fibermux, Inc. announced an ATM-based LAN hub product line known as ATMosphere, while Ungermann-Bass, Inc. and BBN Communications said they were working together on an ATM product line that would span UB's local hubs and BBN's WAN switches. Both sets of products are slated to ship next year.

ATM is an emerging technology based on dividing multimedia transmissions into small, fixed-length cells. The fixed length of the cells makes it possible to manage traffic so as to guarantee that a given transmission gets through in a given time period, while the small packet size provides more flexibility in allocating bandwidth among different devices.

Making its mark

A groundswell of carrier and LAN vendor support for ATM points to the standard's becoming the network "delivery mechanism for the late 1990s," said Frank Dzubeck, president of Washington, D.C.-based consulting firm Communications Network Architects, Inc.

This is despite the fact that several regional Bell operating companies have already introduced services based on Switched Multimegabit Data Service (SMDS), which is widely considered to be ATM's rival.

ATM will overtake SMDS to achieve much more widespread deployment on carriers' and users' networks because it is so much more versatile than SMDS, Dzubeck said.

ATM products on-line

Ungermann-Bass

Range: Local area and campus

Speeds: 155M bit/sec.

Compatibility: UB Access/One hubs, BBN ATM switches

Availability: Late 1993

BBN

Range: Wide-area networks

Speeds: 1.5M and 45M bit/sec. initially, 155M bit/sec. to come

Compatibility: Sonet, UB hubs

Availability: First half 1993

Fibermux

Range: Local and campus networks

Speeds: 9.6G bit/sec. total throughput; up to two 200M bit/sec. links per LAN-to-LAN or LAN-to-backbone connection

Compatibility: Fibermux's existing Crossbow LAN hubs, Sonet, the American National Standards Institute's Fibre Channel System

Availability: Second half 1993

While SMDS only handles data and supports speeds of up to 155M bit/sec., ATM handles voice, data and video at speeds of up to 6.23G bit/sec.

The Chicago Board of Trade, for example, is interested in UB's ATM-based hub module as a way to bring video-based financial information to customers' desks on the same cable that carries their data, said Greg Parcell, supervisor of network technology at the stock exchange organization.

Right now, UB Access/One hubs carry data, and a separate broadband cable television system carries stations such as Cable News Network as well as teletex, he added. Some users can call up video information on one window on their personal computers. However, this requires running two sets of cable to their desks.

"If we could integrate the video right into our network through the hub, it would save us a tremendous amount of money and give us much more flexibility in terms of applications that integrate data and multimedia," Parcell said.

Following up on a statement of direction made last October, BBN and UB announced a joint development agreement to develop a single ATM-based product line that will provide high-speed, multimedia networking on LANs and campus networks and also interface with carriers' ATM-based services, such as broadband Integrated Services Digital Network (ISDN).

However, this "Total Area Network" is not scheduled to become available until 1994. A major reason for the delay is the lack of a finalized ATM standard

Continued on page 90

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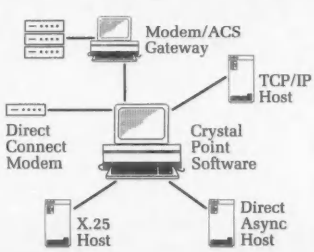

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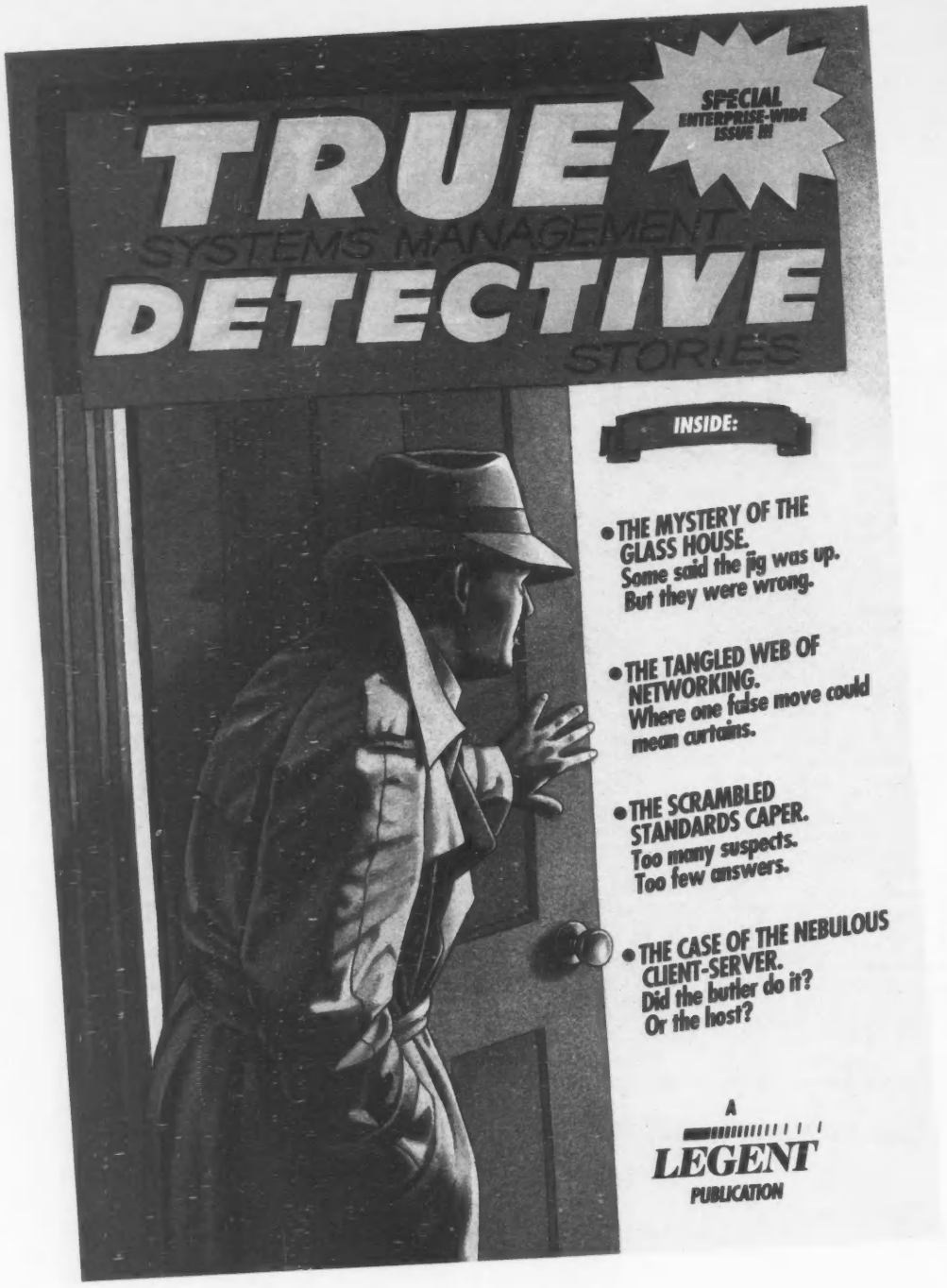
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Too many suspects.
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• THE CASE OF THE NEBULOUS CLIENT-SERVER.
Did the butler do it?
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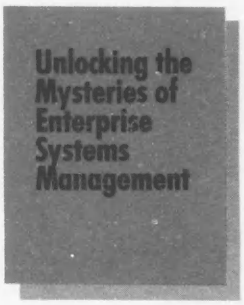

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Fault-tolerant LANs near takeoff

CONTINUED FROM PAGE 81

that "was the equivalent of 48 years over three days" before choosing his FDDI vendor.

He said none of the five vendors' equipment he tested had problems passing data on one FDDI ring.

However, Soulsby had no luck delivering or retrieving data between FDDI and Token Rings when using multiple vendors' equipment.

"When I combined two LAN topologies, I lost information. Sometimes the request for data got to the device, but the information then wouldn't make it back," he said. When testing a homogeneous Fibronics network for three days, he said, the result was that "only seven bits were not recoverable."

This is the equivalent, Soulsby said, of the entire Earth's population walking through a portal 4,600 times and only seven people not getting through.

Able to meet needs

Being a market pioneer cinched the US Air contract for Fibronics. Soulsby said that at the time of the evaluation, the firm "was the only FDDI vendor that could offer bridging, routing and Token Ring functionality in its own product line," as well as compatibility with IBM-based network management.

Soulsby acknowledged that "Fibronics was not chosen because it was the best bridge. No one else could meet my January 1992 deadline for all the pieces."

US Air chose OS/2 for both its server and client platform because using two different operating systems would require difficult "partial software upgrades," he explained. "I've seen other airlines make this mistake."

OS/2 provided the desired multitasking for US Air's servers and could run on the clients.

By contrast, all the Unix vendors that US Air considered, he said, wanted him to run Unix on the server and MS-DOS on his clients. On the other hand, IBM would unbundle OS/2.

"Now we run an upgrade on one server, and the rest of the network runs fine," Soulsby said.

The new airport is running between 600 and 700 OS/2 workstations and nearly 40 servers, he added.

Costwise, as US Air grows, he explained, "we can replicate mainframe cycles on our OS/2 servers five or six times" before reaching mainframe processing costs.

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Smoothing the flight

US Air is developing applications to beef up gate management, baggage tracking and data collection functions, according to Greg Satusky, manager of applications development and airport automation at the airline's Pittsburgh facility. That facility is scheduled to open in October, according to the company.

For example, Satusky said, the airline is customizing Swiss Air's Salto system for managing the flow of airplanes and passengers in and out of the airport.

In addition, the airline is writing interfaces to link detailed luggage ownership and destination information to a centralized baggage-sorting machine serving more than 50 US Air gates.

"This function was missing at the curbside" where skycaps collect luggage, Satusky explained. A touch screen allows skycaps to navigate easily through the reservation system and generate bar-coded "license plates" for each piece of luggage — codes that represent the tracking data.

Another application piling traffic onto the airport's network is the Flight Information Display System, now being implemented, which allows ticket agents to pull up slices of the reservation system into windows on their OS/2 displays rather than cycling through fixed screens to get to information, Satusky explained.

Also, a Data Collection Facility now under development would serve as an intra-airport database "traffic cop." It is "code that listens to events that happen in the reservation system, delivers it to the database, then notifies the affected applications," Satusky said.

He also noted that the airline has an operational savings goal with the projects, which were justified on payback and customer service merits. However, he declined to state expected bottom-line numbers.

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Firms packing more bang for the box

Micro-to-mainframe vendors stuff connections together, promise to save cost

BY ELISABETH HORWITT
CW STAFF

Vendors looking to please cost-conscious customers have begun stuffing multiple micro-to-mainframe gateway and routing functions into a single box. This has the potential to save information systems managers the expense and trouble of maintaining three or four interconnectivity devices on each local-area network.

Up to now, for example, one box has been needed to link Apple Computer, Inc. Macintoshes to IBM mainframes, a second to link DOS personal computers to IBM mainframes and a third to connect the LAN to LANs at remote sites.

Micro-to-mainframe vendors "are going for a bigger piece of the pie — not just 3270 [terminal emulation] but 5250; not just SNA but routing," said Tom Wood, a senior industry analyst at Business Research Group, a Newton, Mass.-based research company.

The vendors are also responding to the demands of IS managers who are searching for ways to "buy more for less, do more stuff on one card," Wood said. Upper management is "putting [IS managers] in the hot seat to show that what they are buying is more productive."

Responding to this situation is Avatar Corp., a Hopkinton, Mass.-based vendor of Macintosh-to-mainframe gateways. "We are now trying to become more of a generic gateway-routing company and less Mac-centric," spokesman Richard Sterry said.

Avatar recently announced a new version of Netway, a Macintosh-to-mainframe gateway developed by recent Avatar acquisition Tridata Corp. Netway 4.0 will be able to perform 3270 emulation for Macintosh, DOS and Microsoft Corp. Windows-based workstations and LAN-to-LAN routing for either AppleTalk or Novell, Inc.'s IPX, Sterry said.

Netway runs on Sun Microsystems, Inc. Scalable Processor Architecture systems on either Ethernet or Token Ring LANs. Netway release 4.0 will ship within 30 days, priced between $6,995 and $13,995.

Avatar's new client software provides a consistent interface by which Macintosh users can access either the above Netway services or Avatar's original MacMainframe gateway, Sterry said. A new MacMainframe software tool, TN3270, allows Macintoshes to communicate with IBM mainframes via the Transmission Control Protocol/Internet Protocol.

Meanwhile, Attachmate Corp. in Bellevue, Wash., has added Macintosh support to Extra, an IBM Systems Network Architecture (SNA) gateway for Ethernet and Token Ring LANs that already supports DOS and Microsoft Windows-based PCs and IBM Personal System/2s. The workstations can all access the gateway's SNA mainframe links from the same LAN, Attachmate said.

Top priority

Another benefit to providing multiple interconnectivity functions in one box is that it cuts down on the growing complexity of inter-LAN installations, Wood said. As companies install inverse multiplexers, routers, gateways and other paraphernalia on their LANs, "the next question is: 'How do you manage all this?' " Wood said. Indeed, IS managers cited this question as the top priority when recently surveyed by Business Research Group.

Attachmate addressed this priority with its announcement of 3270 Gateway Option for Extra Version 3.0, which can track gateway activity and send information up to IBM's NetView network management system, the vendor said.

Extra for Macintosh is priced at $425, while the 3270 Gateway Option is priced at $50. Both are slated to be available early next month, Attachmate said.

Idea is another micro-to-mainframe vendor that recently opted for diversification. The Billerica, Mass.-based vendor announced its Idea Concert Communication Processor, which it said allows the system to interconnect LAN workstations to IBM midrange and mainframe systems over the same links that support LAN-to-LAN communications.

The Idea Concert family supports Ethernet and Token Ring LANs. Prices range from $2,995 to $21,695, depending on the number of interconnections supported. The new software, Release 1.2.3, is available now.

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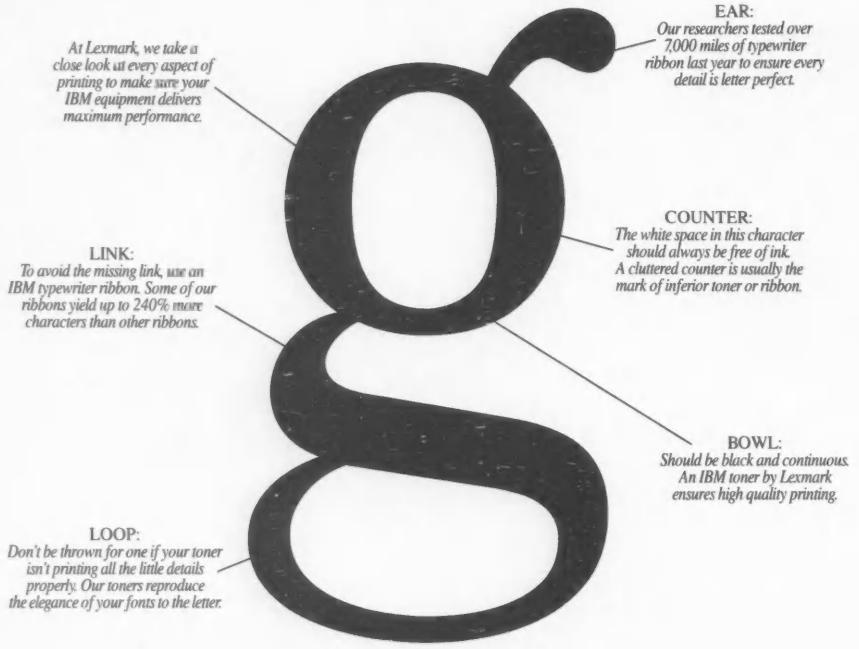
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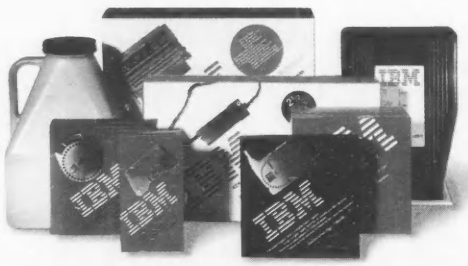

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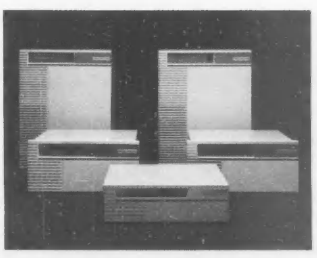

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Iowa to build high-speed network

BY ELLIS BOOKER
CW STAFF

DES MOINES, Iowa — Beneath this city and in parts of the state covered by picturesque corn fields, one of the nation's most advanced integrated broadband digital telecommunications networks is under construction.

The Iowa Communications Network (ICN) will transport digitized voice, video and data, linking hundreds of state government locations, schools, libraries and other facilities along a 2,600-mile fiber-optic highway. The network is scheduled for completion in mid-1994.

The ICN will use the synchronous optical network standard and support both analog and digital data at speeds ranging from 1.2K bit/sec. to 2.4G bit/sec.

According to Iowa officials, the ICN will find one of its biggest users among academic institutions, which will be able to use the video teleconferencing across the network to provide specialized instruction to schools throughout the state.

Videoconferencing is also expected to cut down on intrastate travel.

"The ICN will serve as the foundation and template for revitalizing our educational system in the United States and restoring it to a level of world leadership for all our citizens," Iowa Gov. Terry Branstad said.

The ICN is being built by Kiewit Network Technologies, Inc., one of the three operating subsidiaries of Chicago-based alternative network access provider MFS Communications Co. in Oakbrook Terrace, Ill.

The ICN, with its hub at Camp Dodge near Des Moines, will connect three universities, 15 community colleges, more than 25 private colleges and hundreds of state government offices and libraries. It will also be attached to the Internet, the global academic network.

ATM starting to prove itself

CONTINUED FROM PAGE 81

on the carrier services front, a vendor spokesman said.

BBN said it plans to bring out an ATM switch sometime in mid-1993. However, the switch will support only T1 and T3 speeds initially, a BBN spokesman said.

BBN plans to offer a 155M bit/sec. ATM module when carriers begin providing broadband services based on the Synchronous Optical Network (Sonet) standard, the BBN spokesman said.

Still missing from Sonet, however, is a standardized interface between a carrier switch and customer premises equipment on the user's site. Specifications for this interface are expected out by year's end.

One hopeful sign of carrier participation in ATM is Nynex Corp.'s recent announcement that it has begun beta-testing the Fetex-150 All-Bandwidth Switching System, Fujitsu Network Switching of America's ATM switch.

Nynex will initially test the switch at its Cambridge, Mass., laboratory, then move on to applications trials with the stated aim of piquing customers' interest in broadband applications.

The switch is said to handle regular ISDN and broadband ISDN, frame relay and SMDS.

While Nynex's participation in an ATM trial is another step toward ATM deployment, the company has no say as to when its two operating companies — New York Telephone Co. and New England Telephone Co. — deploy ATM switches, Dzubeck said.

Few carriers have given time frames for providing ATM services. U.S. Sprint Communications Co. said it would introduce ATM at T3 speeds by 1994.

IN BRIEF

Novell drops NetWare SNA

■ **Novell, Inc.** has turned over responsibility for selling, marketing and supporting its NetWare Systems Network Architecture Gateway to **Microdyne Corp.** in Alexandria, Va. Microdyne said it will further develop the product line and ensure compatibility with current and future Novell local-area network products. Novell is also offering Government Open Systems Interconnect Profile-compliant NetWare File Transfer and Access Method at half price, or $2,495. The product is said to implement file transfer on a NetWare network across the Apple Computer, Inc. Macintosh, DOS, Microsoft Corp. Windows, OS/2 and Unix.

■ **MCI International**, a subsidiary of MCI Communications Corp., and **Hong Kong Telecom** (HKT) have announced virtual private network (VPN) service between the U.S. and Hong Kong. Commercial availability of the service between the two countries began May 15. In 1991, MCI and HKT established an agreement to interconnect their respective international virtual networks, MCI Vnet Virtual Network Connection and HKT VPN. The service has been in extensive beta testing for the past few months. Virtual network services such as MCI's Vnet and HKT's VPN provide the benefits of a private line network at lower per-call rates than direct dial services.

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Wireless network tees off at U.S. Open

BY JIM NASH
CW STAFF

PEBBLE BEACH, Calif. — Scores, standings and statistics joined the golf balls whipping noiselessly through the air here as Unisys Corp. for the first time last week unleashed a wireless network for the U.S. Open Golf Championship.

Handheld terminals from Norand Corp. — using radio frequency technology and Unisys software — transmitted scores and golfers' progress from each green to the twin AF series Unisys mainframes on the course. Although largely an opportunity to showcase Unisys' technological know-how to an elite group of business leaders and celebrities, the network was built to speed information among the myriad spectators and reporters following the 92nd U.S Open.

"The scoreboard will have information sooner; the media will have the information on deadline," Rich Skyzinksi, media relations manager for the U.S. Golfers' Association (USGA), the sponsor of the tournament, said early last week.

Tradition will not die with the advent of wireless communications on the links. The USGA still had volunteers manually tallying scores and calling them in over cellular phones and walkie-talkies.

For the first time at any major golf tourney, said Bruce Gould, scoring consultant and Unisys project director at the Open, there were also greenside scorekeepers typing in information on the Norand keyboards. Gould, a golfer with a 20-stroke handicap, explained that the information was being sent at 4.8K bit/sec. to Scoring Central, where the A4s received and verified incoming data.

From there, the figures were stored in a database accessible through any of the 50 B38 CTOS workstations in hospitality tents, USGA offices and media compounds around the oceanside bunkers. The information was immediately available to the British Broadcasting Corp. and Transworld International, Inc., a sports marketing firm feeding video coverage of the tournament around the world.

Simultaneously, volunteers operating the manual leaderboard received scores and news of notable golfers' progress on the Norand machines. The devices, which weigh a bit less than 3 pounds, are already used in Detroit's Palace of Auburn Hills, home of the Pistons basketball team, according to Dan Strother, manager of marketing communication at Cedar Rapids, Iowa-based Norand. There they are used to take concession orders from the stands.

Handheld terminals *transmitted scores and information from the golf greens*

Comparing the portable terminals with cellular phones, Gould said, "I stood next to a scorekeeper and we both called in a score. I had transmitted the score and it had been posted before she was connected after dialing the phone."

Financial savings were not a factor for the tour and the course, Skyzinksi said. Unisys was picking up the cost of equipment and labor in preparation for and operation during the Open. Cables that normally would connect workstations and mainframes did not have to be buried under the course. Yet the USGA expected the performance to be as good as it would be if the cables were there.

NEW DEALS

Unum gets AT&T nets

■ **AT&T** will custom-design an integrated voice-data network for **Unum Life Insurance Co.** in Portland, Maine, under a $10 million, four-year contract recently signed by the two companies. The network will connect more than 60 Unum U.S. locations.

■ **MasterCard International, Inc.** is furthering its business expansion plans in the Asia/Pacific region by upgrading its analog network there to a digital, fractional T1 network based on **Racal-Datacom, Inc.** Omnimux 9000 multiplexers. The fractional T1 links, which support speeds of 64K bit/sec. to 1.5M bit/ sec., will terminate at MasterCard sites in Hong Kong, Singapore, Sydney, Tokyo, Los Angeles and San Francisco.

QUESTION:

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OFFICIAL RESULTS INFORMATION SYSTEM OF THE OLYMPIC GAMES

Wireless growth destined for WANs, not LANs, study says

BY ELLIS BOOKER
CW STAFF

While it may be a dream come true for mobile computer users, wireless data networking has so far failed to capture the imagination of users inside a building — people who have largely declined options in the market to install wireless systems as a replacement for conventional local-area networks.

That is the sober conclusion of the latest report from Datacomm Research Co., a market research firm based in Wilmette, Ill., that specializes in wireless technologies.

Interviews with end users revealed that the market for replacing indoor wiring with radio links is an illusion, said Datacomm Research President Ira Brodsky.

The report, "Wireless Industry Prospectus," described the sales of wireless LANs to date as "miserable." The survey said the combined revenue of the 60 companies offering short-haul wireless data networks was under $25 million last year.

The report forecast a dismal market for "cable replacement" and "subLAN" wireless networks but predicted a somewhat brighter future for what it called "portable data access," including applications such as tracking the flow of goods on a factory floor, in a warehouse or a retail store.

Some users in buildings will also profit from wireless devices — such as a doctors equipped with portable terminals for updating centrally maintained patient records, the survey said.

The portable segment of the wireless LAN market, the survey forecast, will grow from $215 million today to $294 million by 1995.

The touted advantages of wireless LANs, Brodsky said, are undercut by the lower speeds and relatively higher costs of these systems when compared with conventional, wire-based networks.

He pointed out that wireless networks must add considerable protocol overhead to ensure error-free, over-the-air transmission. This in turn reduces the bandwidth available for user data.

"The key to success for wireless LANs," Brodsky wrote, "is applications, not transparent Ethernet/Token Ring operation."

For many industry observers and vendors, messaging applications or services is the so-called "killer app" for wireless transmission.

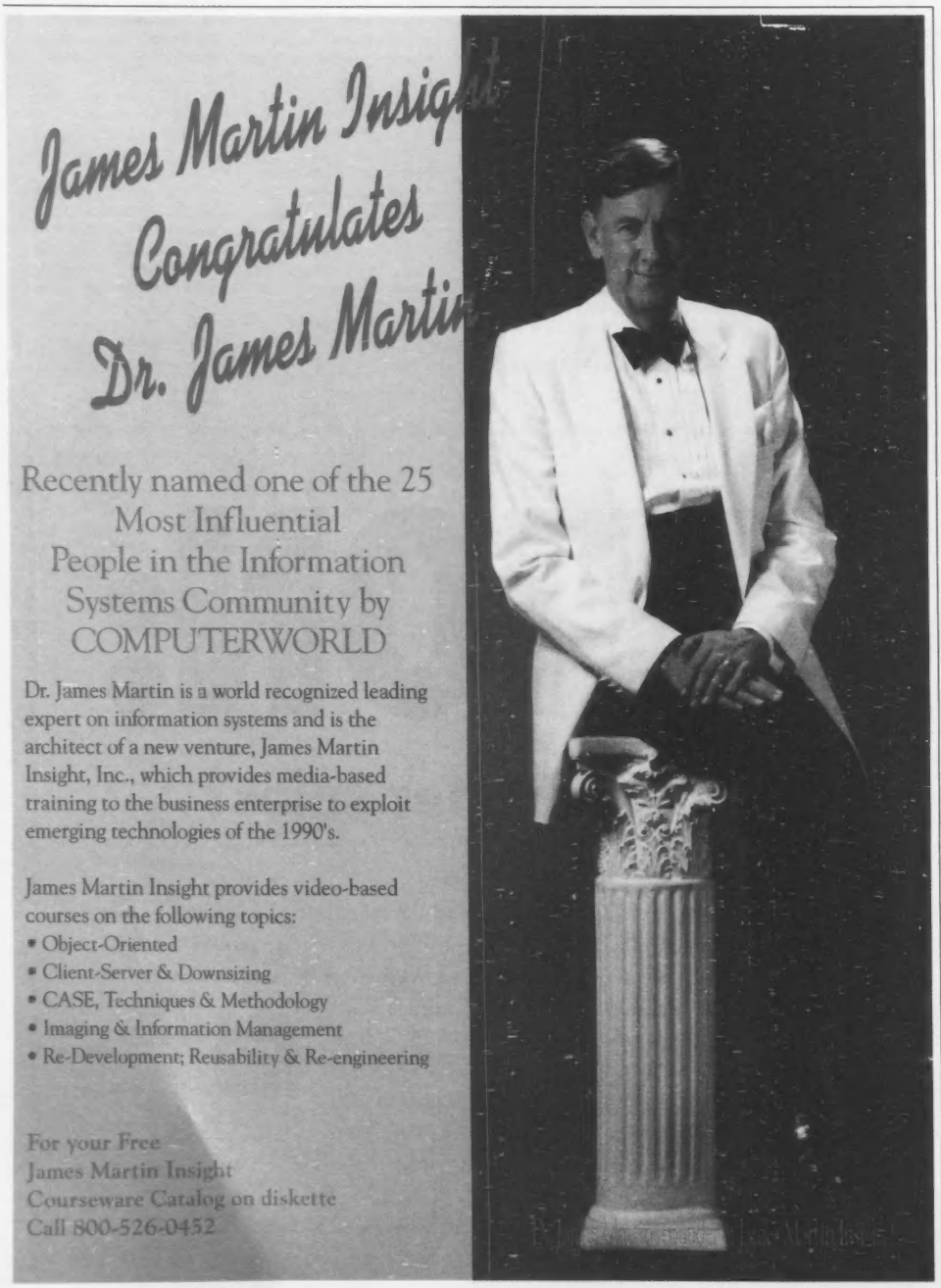
For example, earlier this year BIS Strategic Decisions, a Norwell, Mass.-based consultancy, predicted that "virtually all business correspondence" will be conducted via electronic media by the year 2000.

A cornerstone technology for this, BIS predicted, would be wireless messaging, with its promise of making communications between individuals seamless and ubiquitous.

Naturally, this phenomenon is being aided by the popularity of laptop, palmtop and soon-to-arrive pen-based computers.

Reflecting on this trend — and keeping in mind the fact that the number of private and public network electronic-mail users is growing at roughly 40% per year in North America — BIS projected wireless messaging would grow from $18 million in 1992 to $173 million by 1995.

> "THE KEY TO success for wireless LANs is applications, not transparent Ethernet/Token Ring operation."
>
> IRA BRODSKY
> DATACOMM RESEARCH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NEC boasts ISDN switch is fastest

IDG NEWS SERVICE

TOKYO — NEC Corp. said it has developed an experimental large-scale integration (LSI) switch that can process 5G bit/sec. of information over tomorrow's broadband Integrated Services Digital Networks.

The company claimed the switch has the highest processing ability of any LSI yet devised. Eventually, switching systems with about 1,000 times today's capacity will be able to be constructed using such LSIs, NEC claimed.

NEC said its engineers used new bipolar LSI technology and a new semiconductor layout format with a special memory matrix time switching system architecture to achieve the speed. The switch has 32 channels running at 155M bit/sec. each and an eight-channel serial multiplex 1.4-GHz interface. The company gave no timetable for when the chip might be available commercially.

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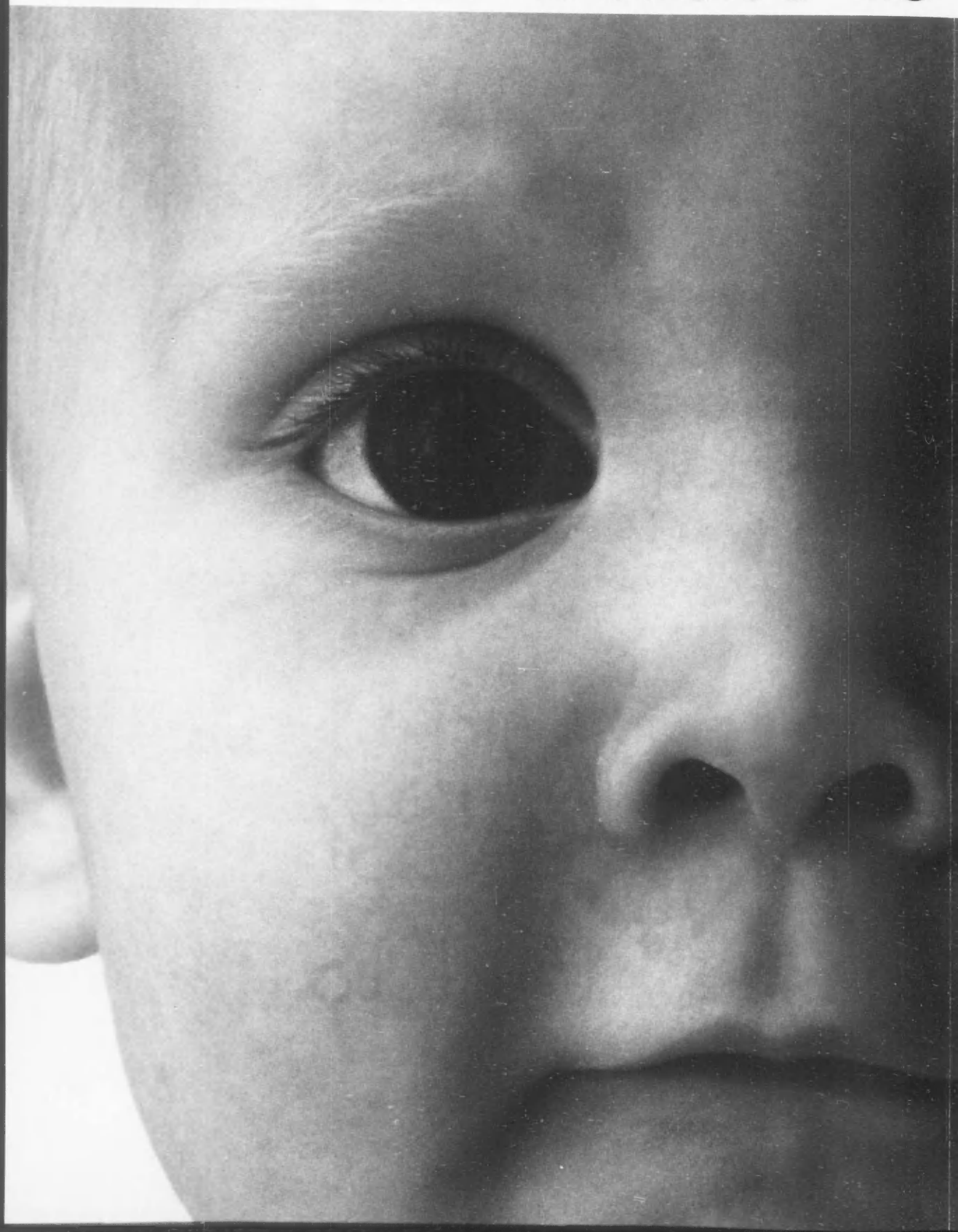

The Next Generation.

As we look back over all the remarkable achievements of the past 25 years, one thing is clear.

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DEDICATION

Breaking molds

NO LIST OF computing leaders would be complete without Rear Admiral Grace Murray Hopper. Indeed, Hopper was on our original list of 25 innovators before she died on New Year's Day at age 85. Although we were unable to interview her for the supplement, we dedicate this issue to her in honor of her pioneering work in the field.

Hopper loved to point to a clock in her office that operated counterclockwise just to illustrate her point that there is no reason that clocks must run clockwise. Defying 1950s skeptics who said computers could only do arithmetic, she developed the first programming language for business applications.

Hopper was a champion of unconventional thinking. "If it's a good idea, go ahead and do it. It's much easier to apologize than it is to get permission," she often said.

Throughout the interviews that follow, you will see that theme carried out again and again. The pioneers profiled here — in their own words — broke the mold of conventional thinking to open new horizons in information systems.

J. Presper Eckert used the concept of subroutines to reduce the number of vacuum tubes in the ENIAC and made commercial electronic computing affordable. Alan Kay scoffed at the notion that computers had to be centralized and invented the personal computer in the late 1960s. American Airlines and Max Hopper plunged ahead with the Sabre airline reservation system on their own, after the rest of the industry decided not to join in. Philippe Kahn promoted an agenda of trusting users at a time when the rest of the industry was copy-protecting software. Steve Jobs put forth an alternative to the IBM PC at the peak of IBM's market ownership.

The value of change was our guiding principle in developing this series of profiles. Working from an original list of more than 100 names, a panel of editors selected the 25 we felt made the greatest contributions in the field of IS.

Some of the subjects enjoy great financial success as a result of their efforts. Others live modestly. Some engineered stunning technical breakthroughs. Others simply put money behind their visions. Most endured skepticism along the way. But all have stuck to their principles and have worked hard at what they believe in.

And in any field, that's what success is all about.

Paul Gillin, Executive editor
Mitch Betts, National correspondent

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Max Hopper

Last September, Max D. Hopper was headed to Dallas-Fort Worth Airport to board a plane for a New York meeting when his son called. Hopper's daughter-in-law was going into labor, and they were headed to an Oklahoma City hospital. Hopper checked his watch and then looked at the departure board. There was a 6:30 p.m. flight to Oklahoma City. "What are your priorities here?" Hopper asked himself. His daughter-in-law, after all, was about to give birth to his first grandchild. He headed for the Oklahoma City gate.

The privilege of position at American Airlines, where he is nothing short of a legend for developing its vaunted Sabre reservation system, got Hopper on the quick flight to Oklahoma City. The baby, unimpressed with her granddad's credentials, refused to arrive as planned, and at 6:00 a.m., Hopper left for New York. The baby finally arrived hours later. Hopper, 56, got to hold his granddaughter in person soon after, giving her a quick reminder of the importance of on-time scheduling.

Recounting this tale weeks later, Hopper's eyes shone with sheer delight, beyond any emotion he could summon while talking about his career as the technologist who changed the airline industry. And Hopper, who also has a passion for wine collecting, likes almost nothing better than talking about technology.

I WAS AT Shell Oil in the 1950s and early '60s at the research lab. I had just finished getting my degree and was working on my master's in operations research. I'd come to the conclusion that I liked to solve business problems. All of us have some basic capabilities, and that was a capability I had; it was something I liked to do.

I had a higher-level goal than playing around with computers. My goal was to continue my part-time education, work and get a master's in operations research.

Then, Warren Graybill, who ran the computer group in downtown Houston, ended up offering me a job. I don't know how he did it — computers were just coming into companies, much like PCs today — but he convinced Shell to buy both an IBM 7070 and an IBM 1401, which cost several million dollars. Both had a lot of power for those days.

He was worrying about how he was going to fill up the capacity. He ended up hiring me, and I went to work selling my services — using his computers — to the research lab. And that's how I really got started full-time into computers. I was 26 years old.

There were no limits. I was an entrepreneur. I went out drumming up business that could be done on this set of computers.

As I look back on it now, I got a tremendous grounding because I learned from soup to nuts. I took over not only the application stuff but I had responsibility for the system software, such as it was on those computers. Nobody else wanted to do it, and I got fascinated by how the computers worked and started looking into the innards of the operating systems. I used to be able to program both the 7070 and the 1401.

I don't know if the same opportunity exists today for a young person. It's become so specialized. Putting it in a business context, there probably isn't that kind of chance today because when you are starting something totally new, there aren't any inhibitions. It was a great opportunity and a lot of fun.

I'm best-known for the Sabre system, but there are other things I've done that I'd like to think have changed or will change people's lives in the future.

I remember working at Shell on a resource allocation model for the company. Another fellow and I worked with the project engineers to develop a series of integrated programs that enabled the company as a whole to examine how well its previous year's investments had performed, what they should look like this year and how they should look next year.

Looking back, I have never seen any other company do that "what if" kind of modeling. We were doing things then with very rudimentary tools that get done by very advanced tools today. It was a very sophisticated use of technology. We didn't think it was visionary at the time. We were trying to solve the problem.

With Sabre, we created the solution for the business problem for travel agents. Subsequently, it made sense as a business itself. But now the reward is in having doubled the revenues in the last five or six years. I'd like to say I've doubled the profit, but that's a harder thing to do.

Sabre was such a big thing in passenger handling, but I believe, over time, there are still a number of Sabre-like opportunities in fields such as cargo, health care, retail — even, to some degree, in governmental activity.

When I think of the people who have influenced me the most, any list would have to include Ross Perot and [American Airlines Chairman] Robert Crandall. [They] are the most intense individuals I've ever met — focused, intelligent and a tremendous breadth in terms of assimilating a problem.

Ross' vision, both from the standpoint of making IS a business and seeing the kind of business it could become, was a major impact on me and my thinking.

"We've had roughly one model of computing for the last 25 to 30 years. Big boxes. We in IS have to change our view."

And you can't work with Bob Crandall for close to 20 years and not have him impact you in many ways. A lot of folks would find the heat working for Bob a little too tough to bear. I must admit there are times when I feel that because he can be very intense. On the other hand, when you step back and look at it more objectively, he's pushed me as an individual to personal growth, which not everyone can say about a boss.

Of course, no career is without its mistakes. Every one of us trips over our own feet once in a while. I made major mistakes probably at every step along the way. It's a matter of having a batting average of better than .500 that enables you to move forward.

I was extremely disappointed not to be able to convince all the airlines to join with us and create a joint-industry [reservation] system. I spent six months leading an industry team trying to create such a system — doing the research and feasibility proposals — and another six months trying to make it happen. That was in 1975. It was with great reluctance that American went into the business independently.

But I don't think it makes much sense to ruminate over things that did not go right. You write a new epitaph every day. You damn well better get on with doing things tomorrow because yesterday's gone. If you think of this being the information revolution, we're gradually creating the information around "What is information? What does it consist of? How do we take data, group it, put it together, formulate it, process it and really understand the processes in such a way that it can be utilized?"

At the same time, the technology is finally reaching a point of ease of use where it takes away the fear. I don't want to know how it works; I just want to be able to use it. The combination of those two things — and the fact that I see no change in the trend of getting more and more price/performance out of the basic technology — means that we can look at two or three orders of magnitude within a reasonable amount of time. I'm somebody who predicted five years ago that we wouldn't use [airline] tickets anymore. I am notoriously an optimist in the use of technology.

The barrier to my vision is becoming more and more societal. We've had roughly one model of computing for the last 25 to 30 years. Big boxes. We in IS have to change our view.

In many cases, the boxes we are seeing delivered today are just somewhat faster, better boxes than we had 20 or 30 years ago. That's where I get concerned from some of the vendors' point of view.

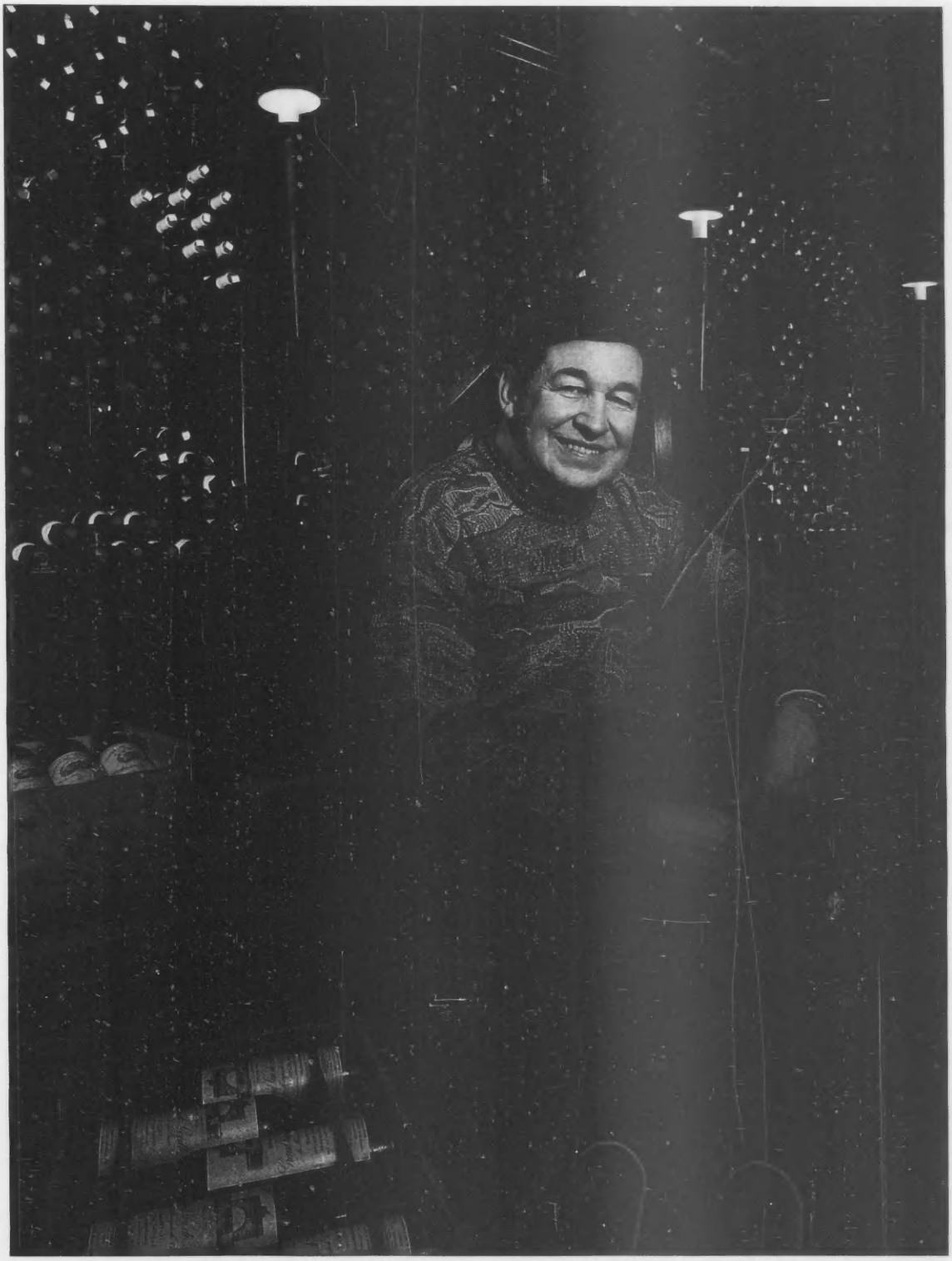
I feel optimistic about the future. I'm not trying to discount the negatives. I have my own concerns about the lack of values being taught. The family is more splintered. Much more time is spent with other entertainment media like Nintendo or TV.

The information revolution is having a major impact. Fifty years ago, do you think the Soviet Union would have broken apart the way it did? A large part of that is because of the technology changes in communications and information, [which contribute] to a common understanding of things.

As technologists, each and every one of us bears some social responsibility for what we do. I hope that we don't put our head in the sand and say we bear no concern about some of the aspects of what we do. Speaking for myself, it plays into how I view some of the systems we build and use.

Interview by Glenn Rifkin, a freelance writer based in Sudbury, Mass.

"I'm somebody who predicted five years ago that we wouldn't use [airplane] tickets anymore. I am notoriously an optimist in the use of technology."



Photography by Dan Bryant

DEC HAND

Ken Olsen

You can take the man out of engineering, but you can't take the engineer out of the man. Ken Olsen beams like a kid going to his first ball game when he spots a new environmental testing room: He really can't wait to take a closer look at the shiny new equipment. But first, he obligingly poses for a photo outside the Maynard, Mass., mill that has been his business home since he left MIT.

From his offices in The Mill, Olsen has seen his company grow from start-up to one that employs more than 100,000 people. DEC has gone through good cycles and bad. In the past year or so, DEC has been letting workers go, although Olsen is adamant that it isn't the recession that has led to hiring freezes or terminations. He says it is the increased efficiency that comes with automation that has cost people their jobs and, most likely, only if individual workers couldn't learn new skills and technologies.

He spoke of his days as a student and a researcher at MIT — how much he admired the talents, contributions and modesty of computer pioneers Bob Everett and Jay Forrester — today's environment and the times in between.

I WAS HAPPY at MIT. I had everything I ever dreamed of. The technology worked well. It was a simple way to make fast computers. We presented papers and did all the things you do in the academic world. But it was a military project, and nobody cared. They said, "Aw, you're just academic people." Of course, we say that about MIT today.

We had seen the effectiveness and motivation of an open, trusting organization that did enormous work. We were motivated to do the same thing outside MIT.

The other thing we had at MIT was interactive computing. The Whirlwind computer was, we would say today, a classic PC. It had 16 bits, which the rest of the world ridiculed; it had a cathode-ray tube; it did not have a mouse, but it had a lightpen; and it didn't have disks, but it did have a drum.

Interactive computing was very strange in those days because people thought it was immoral to have someone play with machines. They were supposed to be dignified, remote, disciplined, organized. Nobody ever touched them. So, our history was to make machines that were fast, inexpensive, easy to use, easy to connect with people, easy to connect with equipment.

Olsen says the chance to demonstrate the feasibility of those ideas — certainly not fame or fortune — led to the creation of Digital Equipment Corp. in 1957.

We were called a hardware company that had no software. We let it go that way and never argued, but it was the software — the operating system — that made the hardware.

We also were laughed at as being technical nerds . . . who didn't advertise widely. But we really were a marketing company. We had a number of business units — 33 at one time, each assigned to marketing toward an industry. So all those years the world said we had no software and no marketing, we let them go ahead and believe it.

Come the early '70s, we had networked IBM and a lot of other things ad hoc, and we said we had to have a standardized approach. We also decided that we had too many platforms, and then we decided we would pick the best architecture and have only one. We would still support the other things, but we would concentrate on one platform, which was VAX, and one operating system, which was VMS, and one way of doing networking.

This took us a few years to accomplish, partly because our engineering wasn't disciplined enough to follow through. It took us a few years and took some major people leaving before we had the discipline. In the '80s, we really exploited that strategy.

Now a number of things have changed in the world. There are a number of computer architectures we just can't reject. We have to integrate them all and use them all, and that is a major change.

[Over the years,] Unix was a creative, undisciplined, free-flowing system, and its place in society was just that. There is a difference between a Unix system and a well-disciplined one from IBM or ourselves. You don't go between the two; there is a place for each.

Another challenge for DEC has been its on-and-off relationship with the personal computer market.

People ask why we are now aggressively in PCs. It's an exciting business, but the actual marketing is a traditional manufacturing company problem. It involves inventory, distribution, logistics — where you buy things, where you warehouse them, where you put them together and how you save pennies everywhere.

It's a traditional business question, and it's one that lends itself to a larger company.

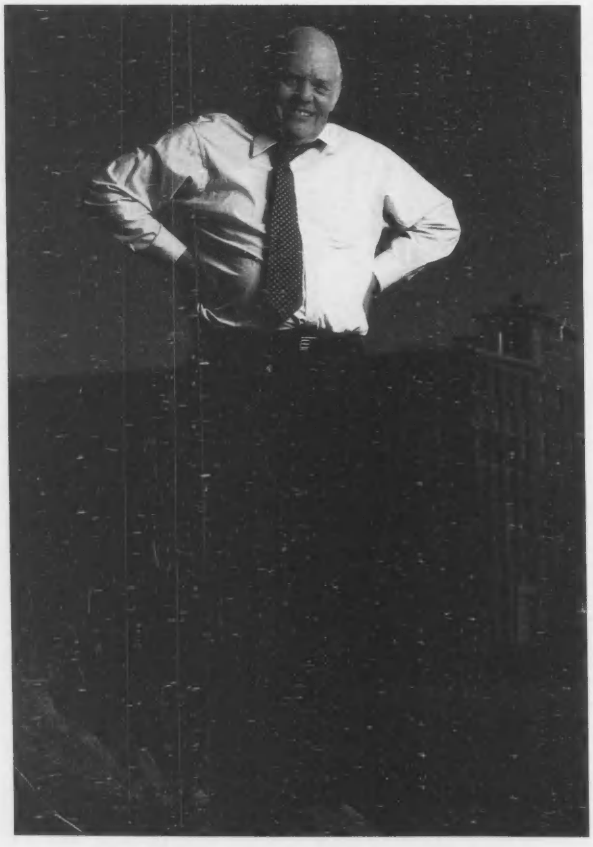
When the PC became active in the late '70s, we formally decided we would not pursue it because anyone can buy the parts at Radio Shack and make a personal computer. That is a slight exaggeration but not much of an exaggeration. So there wasn't much for us to contribute in that. We did the harder things; we did the harder network jobs.

But [now] workstations and personal computers are important to us. Anybody can get into that business, but not anybody can tie them together in reliable systems that can run your business.

Olsen says the pioneers of the computer industry could easily claim that they foresaw the explosive growth of computer technology and applications, but it just wouldn't be true.

We never had any idea it would be this way. We gave speeches, and we said, "Hey, every lawyer, every school teacher, every kid could learn to use a computer and should have one." We may have had vision, but nobody, I mean nobody, had any idea. What we are doing with disks today, two years ago I would have said was crazy. What we'll be doing in two months, I still say is crazy.

Interview by James Connolly, CW's technology editor.



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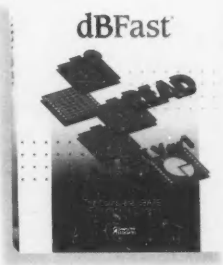

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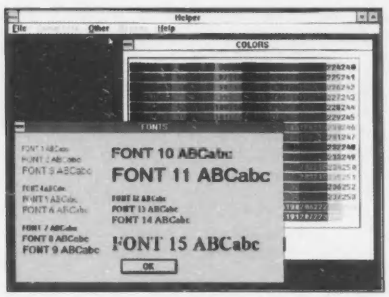

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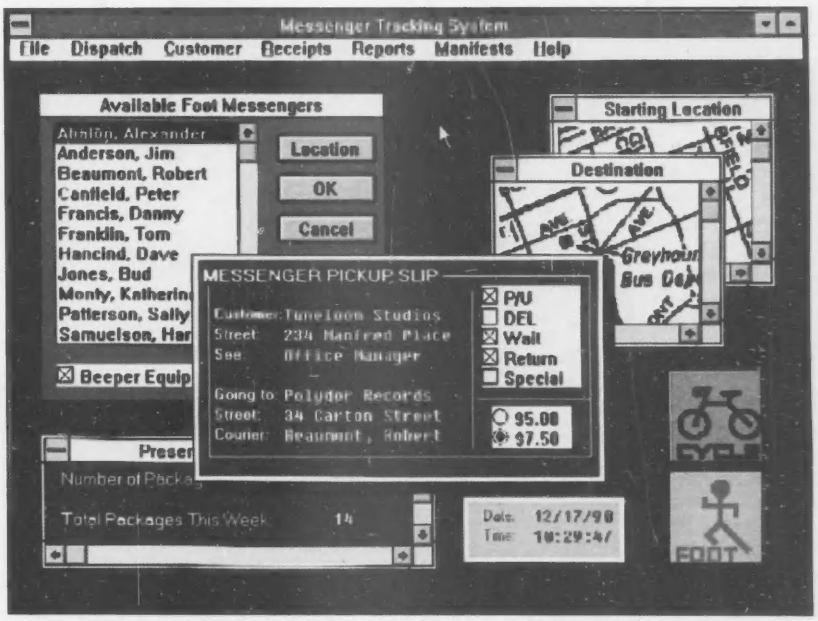

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Ben Rosen

Executive image consultant Jerry Weissman has a story he likes to tell about his Stanford University graduate school classmate, Ben Rosen — the venture capitalist who, along with partner L. J. Sevin, launched the likes of Lotus Development Corp. and Compaq Computer Corp. and whose firm, Sevin Rosen Management Co., is widely viewed as midwife to the thriving personal computer industry.

An inveterate public speaker, Rosen once found himself on a program following an IBMer who had suffered a disconcerting moment when one of his slides appeared upside down and backward.

"Ben, who was appearing for Compaq, immediately rushed to his carousel and reversed one of his own slides," Weissman recalls. "As you see," Rosen told the audience, "we at Compaq strive to be compatible with IBM in every detail."

"That's what makes Ben the success that he is: his ability to put people at their ease with his low-key, self-effacing humor," Weissman says.

And to comfort the competition even while scoring a point for one of his own companies? Bet on it. "Ben is superintelligent," says Sevin, his longtime partner and close friend, "and he's got a lot of chutzpah."

I'VE LEARNED A lot about people judgment from my partner, L. J. Sevin; he's an excellent evaluator of people, and I think that's one of the things that separates a successful manager from an unsuccessful one.

Leadership is almost a by-product. . . . "What do you look for in a management team?" is not a question you can answer because it's going to be different every time. Looking at the people who have started our successful companies, there's not a lot of commonality in their backgrounds, education, experience. [That] makes our job a lot harder because we can see a high degree of correlation between the failures or successes of the company and the quality of the people.

When I think of mistakes, I think of companies that have failed, and I say, "We should have done this or that differently" — but the other side is, it's really good to fail. If you start orienting your life around guaranteeing success, you guarantee mediocrity.

What [L. J. and I] tend to do is try to take big chances and if [the venture] fails, it's not a disaster. That's the nice thing about the arithmetic of start-ups: If you lose, you only lose your investment, but if you win, you win a multiple of that investment.

What bumps there have been in a remarkably smooth reign as perhaps the PC industry's highest profile venture capitalists can be chalked up to one recurring hardship, Sevin says: Deciding when to pull out of an underperforming investment. "And for Ben, I suspect the hardest of the hardest came back in the fall" of 1991, Sevin says. That's when Rosen, acting as chairman of Compaq's board, unseated his friend and protege, Rod Canion, as the then-foundering firm's chief executive officer. "That was brutally hard for him," Sevin says, "but by God, he did it. And I was proud of him for it."

Sevin says his own relationship with Rosen has been "a very easy one," owing to one simple rule: "If one of us didn't want to go into a deal, we didn't."

Back in 1981, L. J. and I were wandering around the West Coast Computer Faire [when] we happened on the booth of a start-up called Osborne Computer. Not only was it the industry's first portable computer — it was being offered at the then-unheard of low price of $1,595.

We were intrigued by the hoopla that Adam Osborne, a consummate showman, had drummed up for his product. L. J. studied the Osborne computer for about 10 minutes. While he's turning his cold engineering eyes on the machine, I'm getting pretty struck by the magnitude of [Osborne's] achievement.

So I looked at L. J. and said, "What do you think?" And without taking his eyes off the product — or lowering his voice — he told me, "What a bunch of nothing!"

Would that we had acted on those words. Unfortunately, we agreed to meet with Adam. BIG mistake. We were charmed — or rather, seduced — by the prospect of making a 10-to-1 return on our investment in a year, despite the fact that our instincts told us the company wasn't going to be a long-term success.

So in July 1981, we invested $100,000 in Osborne Computer. A year later, we forked out another $300,000. The denouement was predictable. When the firm went bankrupt in 1983, we lost our total investment. What we gained was a golden rule of venture capital: If a deal looks bad, smells bad and tastes bad, it must be rotten.

Whether dealing with the many faces of the technology market or leveraging assorted objects off his face, "Ben is a master of balance," Weissman says.

I think the most exciting thing that could happen in the PC industry over the next few years would be a new killer application — some use of computers that would create demand. Most of [the applications] you have now are doing things that we do, [only] better, but those are all evolutionary, not revolutionary. We have to find some need, either business or personal, that's not being solved by computers but ought to be.

Take the pen computing area: If you look at it as a horizontal marketplace you might be kind of skeptical. On the other hand, say you're the claims adjuster for an insurance company; now, suppose a little flat-panel computer will allow you, without a keyboard, to call up from a database any model of any automobile ever made so that when you go out onto the road to look at an accident, you can simply sketch onto the drawing where the damage has taken place and send that back by, say, cellular link to the host computer, which immediately makes an adjustment. There's an example of a very significant vertical market that wasn't there before and that's made possible by the new technology.

I'm a very strong believer that the venture-backed, entrepreneurial company is the most important competitive weapon a country has. It's the most innovative part of our economy and one of the bulwarks of competitiveness.

If you look at the computer industry . . . most of the major developments have been achieved by venture-backed, entrepreneurial companies.

Whenever you go abroad, the people, the press and the government all want to know how to emulate our entrepreneurial economy. It hasn't prospered in any other countries as it has here. Why not? Well, we have a lot of the elements that are necessary to form an entrepreneurial community, where risk-taking is an important part of our culture; where you can fail without stigma; where you can leave a larger company and go to a smaller one without social stigma; where you get mobility of labor.

We [also] have a very broad technology base and well-developed private and public financial markets to provide liquidity. In European countries and the Far East, probably the only thing that comes close to this is Hong Kong. It really created the whole vibrancy of the computer industry.

Interview by Nell Margolis, CW's senior editor, management.

Photography by Joyce Ravid

James Martin

Ever courtly, James Martin has a knack for staying ahead of the leading edge. As "the" information systems guru, he is known the world over for having a visionary outlook that has enabled him to compile an impressive track record of forecasting trends and their impact on business. The tall 19-year IBM veteran's fame is due in part to an electrifying showmanship that packs in seminar attendees year after year. The author of 80 books, his *Wired Society* received a Pulitzer Prize nomination.

Martin's star probably shone brightest in the '60s and '70s, when he was widely viewed as the preeminent computing futurist. These days he is better known for his pioneering work — and sometimes controversial investments and opinions — in CASE technology. His detractors say Martin pushes viewpoints on audiences that are unaware of his investments, but the so-called "Father of CASE" says he's just putting his money where his mouth is.

To the amazement of many, this avid ballroom dancer is actually quite shy and low-key in person. Developer, writer, speaker, photographer, filmmaker, educator and investor — Martin has a wide variety of interests. And as one competitor noted, he doesn't need to do it for the money.

MONEY BUYS THE freedom to take an interest in anything I want to take an interest in. Fame makes it easy for different people to move into different clubs. No one talked to me when I worked for IBM. But once you become well-known, people introduce you to others who are well-known, to a more exciting set of people, parties and dinners. Corporations bombard me with requests to see their strategies because I'm very influential with the customer. I do have to plan — I'm booked through 1995.

Among my successes, I liked getting my Ph.D. and the nomination for a Pulitzer. There's having a successful company, like when KnowledgeWare went public and did well. My biggest challenge is to keep doing what I am doing. To see new things, to take emerging visualizations and to turn them more into reality. CASE turned into a reality.

I'm not ready to slow down. I look at Bertrand Russell when he was 90, and I hope that maybe when I'm 90, or at least 80, they'll pull my wheelchair out of the stage and I'll give a seminar. I have tended to talk about the future all my life. People look at you like you are mad. I change subject material constantly. Change is mandated in the computer industry. You can become obsolete very fast. I never know where I'll find interesting material; I scour the world. I scan the industry all the time, looking for what's new that could change the world — broadband networks, gigabyte networks. I'm very concerned about the impact of them on society, so that takes me into all sorts of areas.

Computers are changing the world faster than the industrial revolution. Some of the biggest breakthroughs have been the personal computer, the LAN and actually some things that haven't quite happened yet. There are very important breakthroughs where we're just at the beginning and people don't realize just how important they are, like object orientation. None of which will change things by themselves — it's the collection of all of them that will change the world.

"We absolutely need a total revolution in the way we build software."

The power of the desktop is going to grow incredibly. And LANs are going to use optical technology. It will create islands of automation, and we really don't want that. We want worldwide computing, so there is a very big emphasis on how to make use of worldwide optical-fiber trunks to build very high bandwidth networks. So a lot of people are doing research that will pay off in the second half of the '90s in gigabit networks.

We're going to see a very rapid growth in LAN servers using a new breed of servers from the likes of Parallan, Compaq and IBM. A minicomputer is not the right architecture. It's the wrong machine and software path. All the changes originating with client/server technology are very different from minis or mainframes. You'll end up with the wrong software, and that's not what you want at all.

We're going to go to long-distance, broadband gigabit networks. An important breakthrough in fiber optics, to transmit 100 gigabits per second. We're going to see the increase in miniaturization continuing for about the next 20 years. Multimedia is very important. We've only seen very highly specialized or isolated examples of this technology used well. I think massive applications will result from it. It will take about 10 years to build up.

NCR has taken the view that the mainframe of today must change into a highly parallel system with cheap chips — vast numbers of them. There probably is a [future] role for the mainframe, but it will have to change its architecture quite dramatically.

We [already] know technically that we can build a machine, a processor, 10 or 15 years from now which you might call a teraflops machine. It'll be about the size of a beer can and cost about as much as a Cray XMP today. And if we build as many of them as we build cars, then we'll drop to a very low price. So you run into an interesting question: Is there anything that will cause sales of a computer with that level of power so that you can sell 20 million a year? We're actively seeking a use for it.

[In] hardware, the machines will become highly parallel 10 years from now. [Today] the memory chip is extremely cheap, and the processor chip is maybe 100 times more expensive. If we sell an extremely large number of processor chips, they will become very inexpensive also. That's probably going to happen as we get massively parallel.

We have to learn how to program and design for massively parallel computing. Once connected to optical fibers then it becomes technically possible to build something. I think we'll be fairly close to being able to build Hal in [Stanley Kubrick's] *2001* [: *A Space Odyssey*]. The software is nowhere near that close. The image I like to create in people's minds is Hal having nothing to do but run spreadsheets.

So this is an indication of the extreme difference between the evolution of hardware and software. We absolutely need a total revolution in the way we build software.

This is the '90s, and it doesn't make any sense to have a three-year [applications] backlog. Cobol was fine in its day, but it's very clumsy. We can do much better. We have to revamp programs through revamping programmers. They will just have to learn new technology. [IS departments] should expect to revamp all they have.

We need to go to rightsizing of IS. The recession has caused some [companies] to slash back too far. If you take away the resources that are making you competitive, it's like the farmers eating seed corn.

Certainly in most corporations there is something which should be outsourced. In corporations where IS is efficient, it's probably wrong to outsource everything. You don't outsource the things which are the crown jewels of your corporation, like systems planning or the enterprise model.

Interview by Patricia Keefe, CW's assistant news editor.

Photography by David Gamble

Steve Jobs

In 1975, Steve Jobs and Steve Wozniak cleared a corner in a garage, sold a Volkswagen microbus to raise capital and established Apple Computer, Inc. From its inception, Apple was a decidedly different company. It boasted a counterculture attitude that emphasized integrity over profit, positive social contribution, team spirit and a laid-back atmosphere. At Apple's headquarters in Cupertino, Calif., it was also a well-accepted fact that the best way to predict the future was to invent it.

In 1984, Apple did just that. The introduction of the Macintosh not only marked the debut of one of the most celebrated products of the personal computer age but was also a pivotal point in making the PC the ubiquitous item it is today. The Macintosh was a startling masterstroke: It oozed friendliness yet offered a sophisticated technology. Computers had never before been so inviting and nonthreatening.

Jobs left Apple not long after the Macintosh's introduction, ironically forced out by the man he brought in as Apple's chairman in 1983: ex-Pepsico chief John Sculley. In late 1985, Jobs founded Next, Inc., through which he hoped to seed his next generation of breakthrough technology. After a slow start gaining customers for its unique black cube workstation, Next has finally begun to build a full head of steam. Once again, Steve Jobs seems anxious to invent the future rather than wait for it to arrive.

I'M A TOOL builder. I'm proud of that. I love building tools and seeing what people do with them. Tools bring out the intellect and creativity in all of us. It's amazing what people do with them. I've just been lucky to have been at the right place at the right time and to work on the most miraculous tool humans have ever created: the computer.

These days you hear a lot of talk about something like biotech being the Next Big Thing. But it's not the kind of thing your kids use or you can pop in your briefcase. It doesn't have the same connection. It's not a tool.

I got interested in electronics at an early age. I grew up in this valley when there were still apricot orchards here. Hewlett-Packard was the role model for my generation of people who got into electronics and computers. My heroes are [HP founders] Bill Hewlett and Dave Packard. Bill and Dave used to have a program every Tuesday night where they'd take a bunch of young kids and give them a lecture about technology and discuss how they treated their employees. I went to one of these talks when I was 12.

Later on, I called Bill Hewlett at home. He was still listed in the Palo Alto phone book. I just wanted to talk with him because he had made a big impression on me. Eventually I got up the nerve to ask him for some spare parts for a frequency counter I was working on. We chatted for about 20 minutes. He's still one of the people I admire most. And I still admire the people who built this valley: Bill Hewlett and Dave Packard, Bob Noyce, Andy Grove.

The people who started the personal computer industry were creative folks looking for an outlet. A lot of them would have been artists and poets and musicians and bohemians if they were not into computers. Computers captivated a whole group of people who initially were not interested in business, and that's a good thing. Most really good industries are started by people with no business background. Did Henry Ford have a business background? Did the Wright Brothers? Fortunately, business is not impossible to learn.

You also learn by making a lot of mistakes, but I don't think mistakes are bad. I've certainly made my share of them — the Apple III and the Lisa come to mind rather quickly. But if you learn from mistakes, that's how you grow. There would never have been a Macintosh without a Lisa.

Maybe part of the problem today is that we're not seeing enough mistakes. We're not seeing enough risk-taking. Everything is very incremental, very safe. I see so much work going on that is not adding a lot of value. Part of that is because more companies are being run by nontechnical people. I see a lot of people in the computer industry for financial rrasons. That's not how it was when we started.

And that's too bad because I don't believe the industry is anywhere near mature. I think we're in the first inch of a mile-long vector. The rate of technology change is speeding up, not slowing down. And every time there is a change, there is a new opportunity for great products. What's going to happen in 10 or 20 years? I don't know. I know that computers are getting dramatically faster and a lot of that speed is going to be put into intensive graphics and communication. Whereas the '80s were the decade that personal computing became pervasive, the '90s will be the decade everybody gets connected.

The major hurdle, however, is that we've developed computers to just run shrink-wrapped applications. They haven't been applied to overall productivity and that's their biggest failing. What we have to do is apply desktop computer concepts to servers and get into operational productivity.

"Part of the problem today is that we're not seeing enough mistakes. We're not seeing enough risk-taking."

Companies are going to get competitive advantage from two places in the '90s. Since we all have the same PCs and shrink-wrapped software, there will be a need to write mission-critical custom applications that go right to the heart of operational efficiency. People are going to get this competitive advantage not from focusing on individual productivity like the PCs do but by focusing on group productivity. Collaboration. The real big questions of the '90s are going to be "How do we write mission-critical custom applications very fast and very reliably?" and "How do we improve group productivity and collaboration and not just individuals' productivity?"

But it's going to be tough. Being in the computer industry takes a lot of money these days. Newcomers ought to raise money from wherever they can and give away as little of their company as possible. You shouldn't be owned by someone else. Could two guys named Steve Jobs and Steve Wozniak make it in the computer business today? Not in the hardware business. Not building full systems. They might be able to build peripherals, but they couldn't build a whole system. Too expensive. They'd never be able to raise the venture money. Today, you see small companies acting as the R&D arms of larger companies. And that will continue.

I love our industry. It's a funny one, though, because it's one in which you plant seeds and you work very hard and five or six or seven years later something starts to really happen. And we need to keep planting those seeds here in America. We need to keep investing in this industry because it is clearly not mature. It's just in its infancy. The benefits accrued [from having] this industry here in America have been incalculable, and we need to make sure it stays here. We need to keep planting those seeds.

The computer industry has also made me very proud. I'm proud of the Apple II, the Macintosh, building Apple Computer, building Next as a company and building the Next computer.

I'm also proud of my family. We had a child not too long ago, and it's a much bigger thing than I ever thought it could be. It changes your world. It's almost like a switch gets flipped inside you and you can feel a whole new range of feelings that you never thought you'd have. It's sort of like if you never saw green and all of a sudden you have a child and you can see green for the first time. It's much more profound than I ever would have guessed from hearing about it.

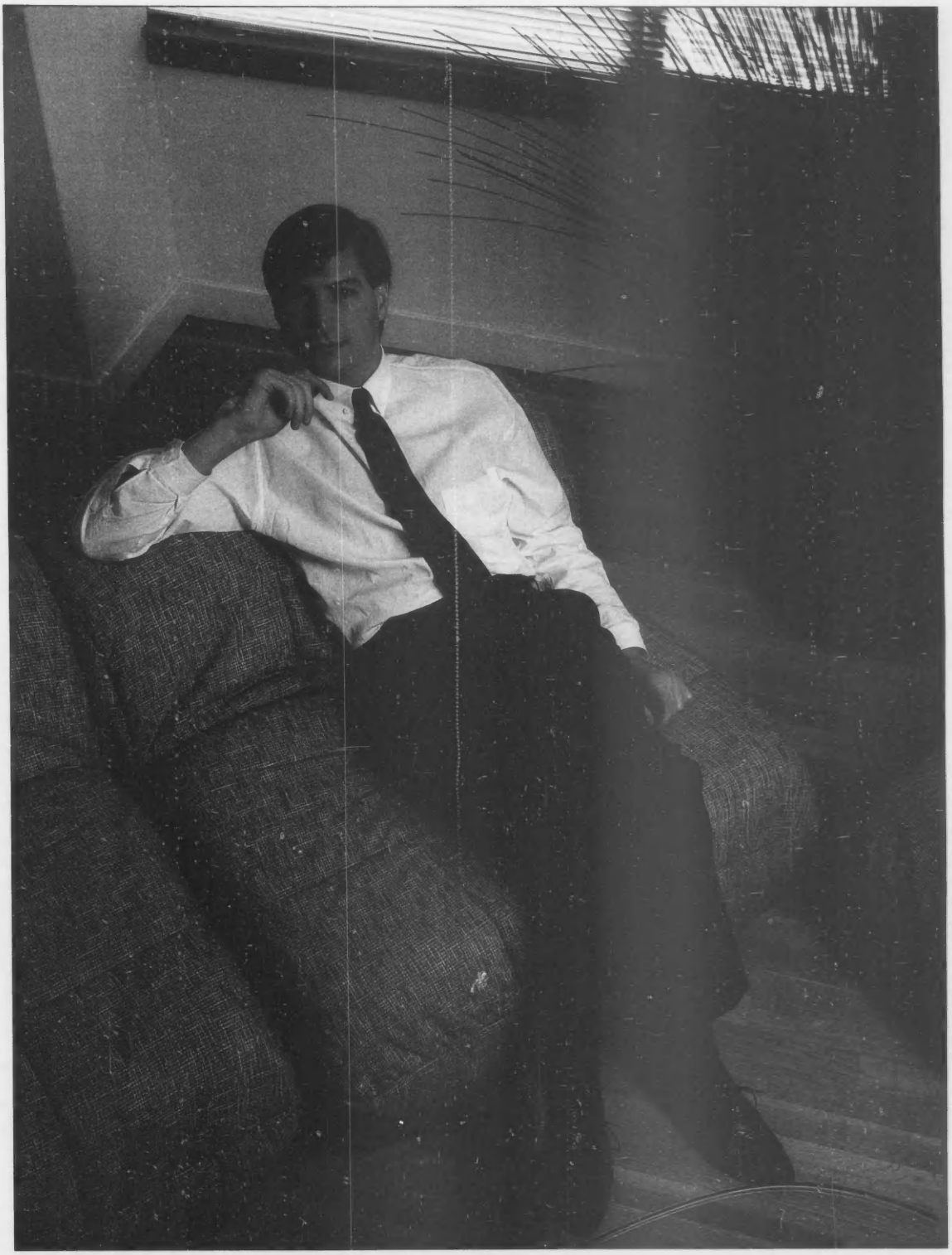
I look at my son and expect that one day he's going to be talking to his friends in Moscow and Tokyo over the computer network. Hopefully, he'll be using computers from Next and bugging me to bring home the latest one. That's one of the reasons why I like what I do.

Sure, I've had some regrets, but it's not important to me to speculate on what might have been. Apple, for instance. It's far different now than what it would have been had I stayed on board. But I don't want to go into that. You only have one life. But I still keep in touch with some of the people I knew at the beginning — Woz and [early Apple employee] Bill Fernandez. I'll still go over their house for dinner once in a while.

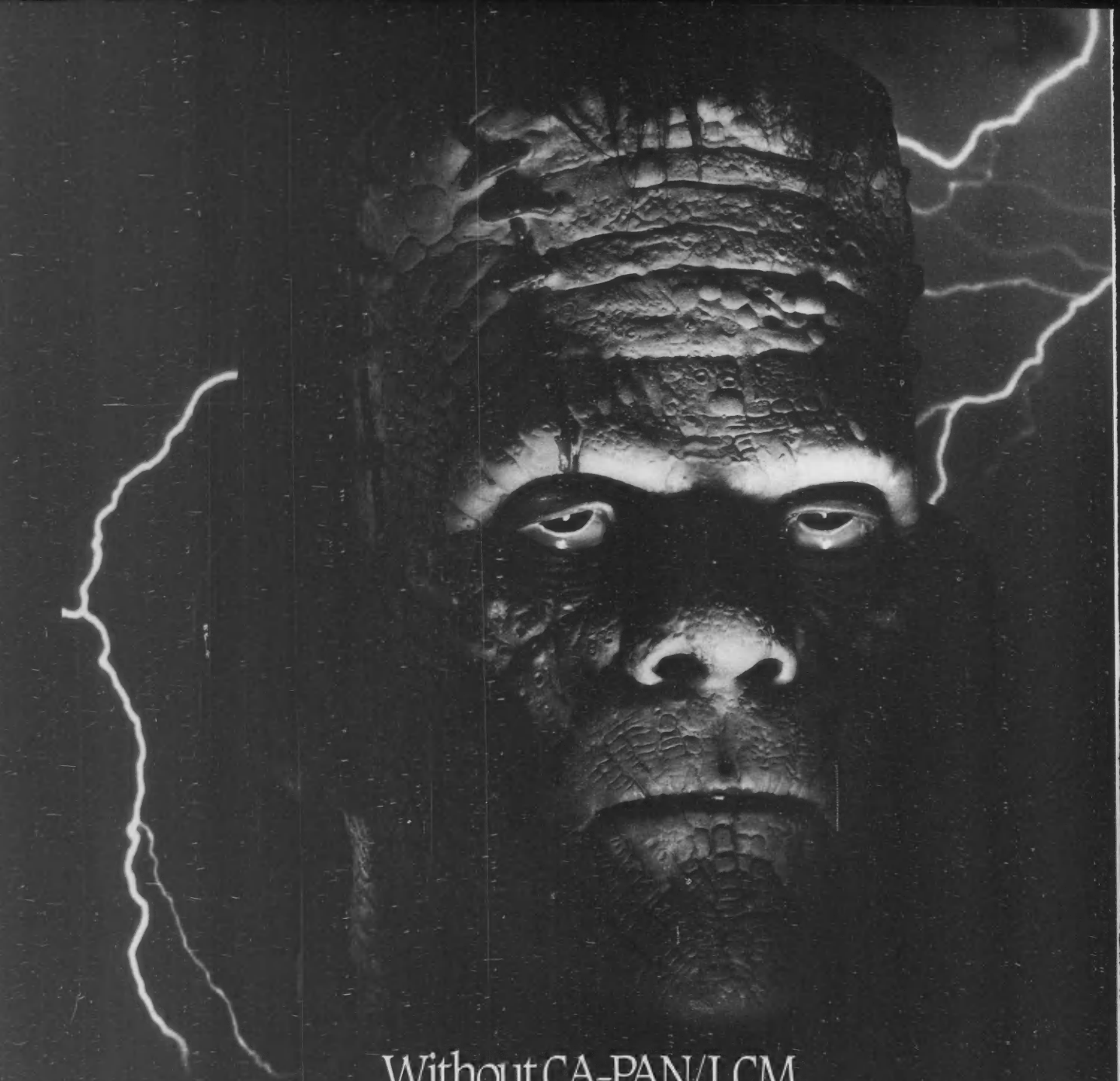
But I don't read the newspaper articles on me. I don't read the books. I haven't talked to many of the authors who say they're my best friends. I haven't even met most of them. I just do what I do and would like our work to speak for us. Ultimately, the work is all that's really important. I try to not pay much attention to the recognition I receive. I'm pretty indifferent about it. It's not like I'm Michael Jackson. I think we're born, life is brief and in a flash we're dead.

Interview by James Daly, CW's West Coast senior correspondent.

"The people who started the personal computer industry were creative folks looking for an outlet. A lot of them would have been artists and poets and musicians and bohemians if they were not into computers."



Photography by Ed Kashi



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BIG IRON BUILDER

Gene Amdahl

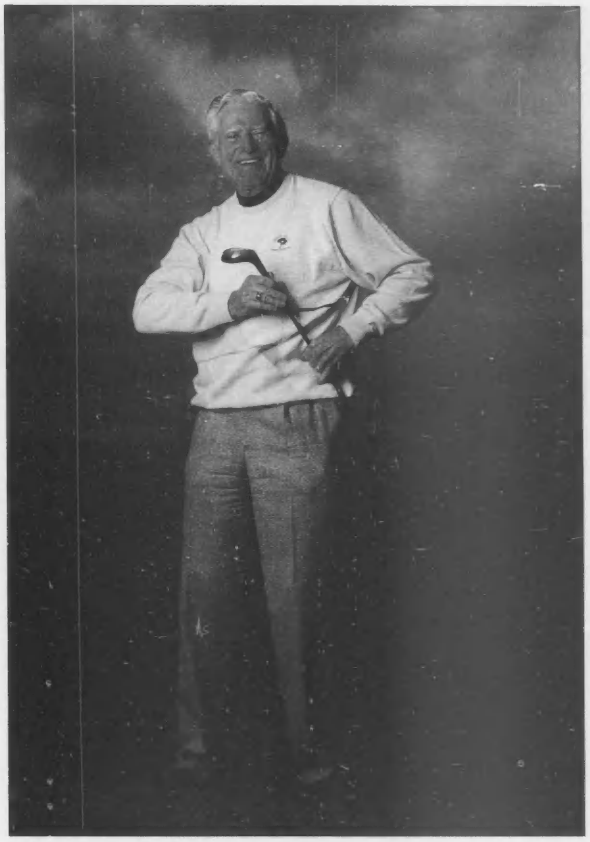
To this day, Gene M. Amdahl prefers a mainframe and a calculator to a personal computer. "At home, I just have a calculator," he says. "I can't find my slide rule."

His undying love for the mainframe is not surprising. Amdahl designed the IBM/360 mainframe in the early 1960s and has spent the last 20 years making mainframe computers that compete with IBM's hardware, yet run IBM's systems software.

He is probably best known for founding in 1970 the very successful, $2 billion Amdahl Corp., one of IBM's prime competitors. But he also endured two less successful Silicon Valley ventures in the 1980s: Trilogy Corp., which never produced a product, and its successor, Elxsi Corp., which has since become a holding company for a restaurant chain.

Today, Amdahl runs Andor International Ltd., a small firm located just across the street from Apple Computer, Inc. The 1988 start-up is working to protect IBM data centers by storing their data in safe havens hundreds of miles away.

Amdahl, who turns 70 in November, is just as proud of his latest invention — a disk-mirroring system for disaster recovery — as he was of his first computer, which was built at the University of Wisconsin.



I WOULD HAVE been retired by now if I'd stayed on the farm. I was raised on the farm just outside of Flandreau, S.D. I was operating farm equipment and that was the high-tech stuff then. We didn't get rural electrification until I was in high school. I didn't know when I first entered college as a mechanical engineer in 1941 that I would end up in computers. I sort of thought my career in physics was like deciding to be a monk — in the sense that it would be a labor of love for the rest of my life.

IBM found me when I was at the University of Wisconsin in the early 1950s. I was working with two other grad students to study the weak forces and the strong forces of attraction in atoms of tritium. It took us 30 days, using a slide rule and a 10-digit desk calculator, to hold a 12-place number. We concluded that there had to be a better way, so I began inventing computers.

What I really tried to do at all times was to provide equipment that was economically useful to a wide market. I have more than 30 patents. But I advanced the detailed design nature of computers consistently throughout my career. All I can say is that you always take your next step from where you are — not where you're looking, thinking of or dreaming of.

I've always liked to work for myself. Even at IBM, I always wanted to do things the way I wanted to do them. When I got put into top positions where I couldn't do that, that's when I would leave. [Amdahl left IBM in 1955, returned in 1960 and left again in 1970.] I felt I was always trying to do something that was the best that could be done.

When I was leaving IBM [in 1970], I told them what I was going to do. I couldn't be persuaded to stay by the president and chairman of IBM. They were not able to change my mind. And the president of my division had been waiting in a nearby office to see how it would turn out. As I walked down the hall, he walked along with me, put his arm across my shoulder and wished me well. He said that there was no [more] money to be made in large computers. You have to understand that, from his point of view, that was true.

The Amdahl computer depended upon having a new [VLSI] technology so that we could achieve higher performance with a simpler machine structure, with a lower cost [than IBM]. It was a machine that was two-thirds as powerful as its [IBM] competitor, and it went for essentially the same price.

The foundation on which I based the whole thing was that if we put this out with sufficiently more power than IBM's most powerful machine, IBM could only respond by reducing their price. And if they reduced the price on that machine, they would have to reduce the price on all the others. It was a domino effect. I might have been the only man in the technical area that knew that.

When people talk about the mainframe being a dinosaur, I disagree. The reason is that the investment in terms of equipment and mainframe software is very large. The applications are worth five or six times more dollars than the money invested in the mainframe hardware itself. It's not in the cards that they're going to be discarded or redone.

Amdahl has made a second career out of competing with IBM, but he is gloomy about the computer giant's outlook.

I can tell you that when I was in IBM, the long-range planning was not too successful. The great majority of projects were done to meet a crisis. I think it is still pretty much the same way. They do have long-range plans, but some of these projects are too pressing. The result is that the long-range plans need to be revised and modified because the pieces of the project that were done did not really fit.

I'm not convinced that the [recent] IBM reorganization will do very much. The only thing that's really different, as far as I can tell, is that they let the divisions set the price [for their products]. That's positive, but I'm not sure it's enough. I don't want them to come apart at the seams.

Amdahl is also pessimistic about the near-term prospects for U.S. competitiveness, given the state of the American education system and a not-invented-here attitude.

We won't [improve until] we start changing our attitude toward things; for example, if we consider manufacturing to be a dirty job and lawyering to be a most respected job. As long as that persists, we are not going to make it industrially, and until we begin to value teachers more than we value plumbers, I don't think we are going to be in a position to compete. We are on our way to becoming a Second World country.

Until the patient decides he's sick, he is not going to take any steps to get well. There has to be a cultural change. People aren't performing at our schools. The long-term growth of our nation has to be based on increasing our knowledge base. Knowledge is the foundation of our revolution.

Interview by Jean Bozman, CW's West Coast senior editor.

Photography by Alan Levenson

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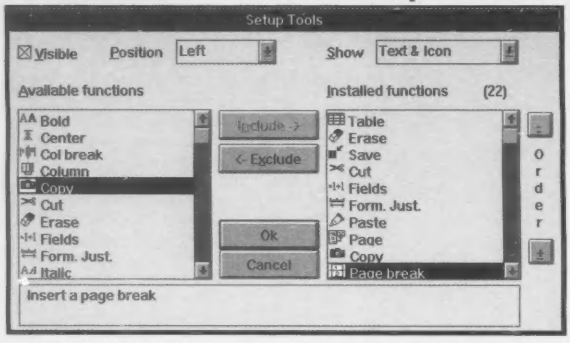

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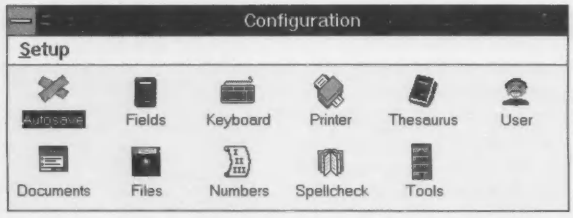

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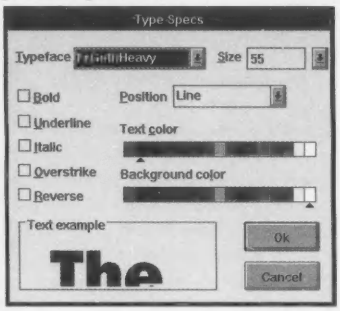

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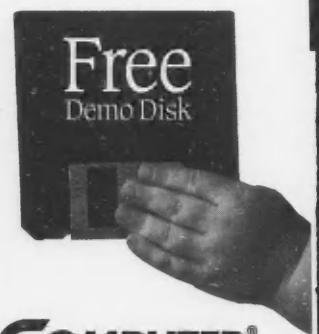

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Gordon Bell

When Chester Gordon Bell was recovering from a near-fatal heart attack that occurred during a 1983 vacation in Snowmass, Colo., his doctor constantly monitored Bell's neurological functions. "Who is the president of the U.S.?" the doctor queried Bell after the brilliant computer engineer emerged from a day-long coma. Bell, so apolitical that he had never even voted, replied, "I don't remember, and it really doesn't matter."

To those who knew him, this signaled that Bell's brain was indeed intact. Bell's brain also told him that it was time to leave Digital Equipment Corp., where he had guided the creation of virtually every important computer system the company sold, including the best-selling PDP-11 and VAX series.

In the nine years since his departure from DEC, Bell has not slowed his pace; he has simply aimed a shotgun blast of energy and talent at the industry, spending time on various development projects and corporate boards and in advisory roles.

MY FOCUS HAS always been on products, but now it's more broad than it's ever been before. I like to get down in the details. You can only contribute to things if you really understand the technology and what all the constraints are.

When I consider my greatest accomplishments, certainly the VAX and then the VAX environment are at the top of the list. To me, the importance of VAX was the overall vision. IBM's computers all sat in a glass room. In the VAX environment, we were putting these computers everywhere, fully distributing them using Ethernet and all the DEC networking.

I don't mind being linked to the VAX. It's the most important thing I've done in that it touched more people than anything else. Given what I'm doing now, I'm unlikely to have anything else that far-reaching.

On the other hand, there are many accomplishments that rate highly in my career.

I set up the computing directorate at the National Science Foundation and co-authored the High Performance Computing and Communications Initiative. I was a founder of the Computer Museum, which is likely to outlive all the organizations I've worked with. [My wife] Gwen made that work.

I am currently working with Microsoft on several projects that are likely to be as important as VAX, and I've been involved in the formation and growth of a number of start-ups such as Mips, Wavetracer, Wolfsort and Chronologic. I will always be measured against VAX, however. People say, "You did VAX. Now what are you doing?"

In a funny way, I have always been my own harshest critic. It's become a matter of adjusting my level of expectations of what I should do and understanding what the trade-offs are. Do I want to give up any of these things I enjoy to try to get that second big hit?

I've also had the opportunity to mentor and support a long list of creative people such as Henry Burkhardt, founder of Kendall Square Research, Dick Clayton at Thinking Machines, Dave Cutler at Microsoft, Dave Nelson at Fluent Machines, Jeff Kalb at Maspar. I respect really bright people. That is one of my flaws. I have often bought a sales story from someone who is very bright without understanding his flaws.

I see Dave Cutler, the man who created VMS, every time I go to Seattle. He is working on Microsoft NT, which I think is going to be very far-reaching. It's going to grab the rug out from under Unix. I'm head of Microsoft's technical advisory board and consulting with them on these two key products.

I loved managing engineering at Digital, which is one thing I rarely get any credit for.

One of the things I'm happiest about now is the Gordon Bell Prize for Parallelism that I give each year. It's my personal gift of $3,000 to $5,000 a year to people who get the most out of large computers.

I was out at Los Alamos at a dinner. One of the guys who won the first prize came up to me all excited and said, "You've totally changed my life. Nothing like that ever happened. Winning that prize just totally changed our project." That felt really good.

My father was probably my greatest influence. He had an appliance store and a contracting business and did repair work. I was working as an electrician from the time I was about five or six. He retired when I went to MIT. He was a mentor and all that. I learned intuitively about handling people and customers. My mother was a school teacher — intellectual, inquisitive and, at 91, is very active mentally today. Both parents were straightforward, positive, nonjudgmental and good teachers.

I, on the other hand, can be very judgmental. My view of the industry is a good example. The thing that 99% of the computer industry doesn't understand yet is that technology is destroying the industry. In 10 years, you'll see 99% of the hardware and software systems sold through what are fundamentally retail stores.

Then there's the intermediate job, which for DEC, IBM, Unisys and HP is being systems integrators. We've got all this stuff coming out; now how do we put it all together? I don't see that as a long-lived phenomenon because the world can't stand that much adhocracy in computers.

Twenty-five years from now ... the computer disappears. Computers will be exactly like telephones. They are probably going to be communicating all the time so that no matter where I am, they are going to be attached to the network. I would hope by the year 2000 there is this big [networking] infrastructure, giving us arbitrary bandwidth on a pay-as-you-go basis.

I tend to be optimistic. So what I think of as happening in 10 years, I automatically double it. In projecting, I'm usually off by a factor of two. Somebody once said, "He's never wrong about the future, but he does tend to be wrong about how long it takes."

Interview by Glenn Rifkin, a freelance writer based in Sudbury, Mass.

Photography by Alan Levenson

J. Presper Eckert

J. Presper Eckert has always admired James Clerk Maxwell, a 19th-century scientist who put the theory of electricity and magnetism into four equations. Eckert enjoys telling about the time that Maxwell went before the Philosophic Society in England. One of the illustrious scientists of the time asked, "Professor Maxwell, what good are these equations?" And Maxwell said, "Well, what good is a baby?"

Eckert's baby, in computing terms at least, was the concept of internal programming, which he used in developing the first large-scale digital computer, the ENIAC. In 1946, Eckert and colleague John Mauchly developed the 30-ton ENIAC at the University of Pennsylvania's Moore School. It was 100 feet long, 10 feet high and contained 18,000 vacuum tubes.

Eckert was also instrumental in developing the first commercial computer, the Univac. He and Mauchly sold Univac to Remington Rand Corp. in 1950, creating what would become the Univac division of Sperry Rand Corp., which later became Sperry Corp. and finally Unisys Corp.

ONE OF THE last courses I took at Penn was electrodynamics, taught by a Dr. Swann. He said that everything you learn in teaching, and in life, can be divided into two major categories: things that are complex and things that are perplexing.

Throughout my life, I've always thought that the first category, complexity, fit the computer. But to apply the computer to Einstein's theory is a perplexing problem. There are not a lot of pieces that make up Einstein's theory, but the concepts are new and earth-shattering and hard to grasp at first, and it's a problem of perplexity.

So it always encourages me that Dr. Swann's words were so prophetic . . . and that I would spend most of my life working on a machine whose major effort would be to do something about the problems of complexity in the world — but it would not help with the problems of perplexity. As far as the productivity of the white-collar worker — to the extent that he's fooling around with complexity — the computer must be an enormous help. To the extent that he's fooling around with problems of perplexity, it won't help a damn bit, probably. Except in one indirect way. If he has ideas and wants to carry out models to see how far they will go, then he may get some further insight into his perplexing problems by using a computer.

I think that, by definition, the things the computer can't do are the perplexing problems. For example, what should be done about abortion in the U.S.? How in the world would you solve that with a computer? You could gather more statistics, but the people who make up their mind on this don't look at the statistics.

In education, the problem is that as a nation we're more interested in how much baseball players get paid, for example. Today the salaries have gotten out of hand, and yet, what is the top salary for a mathematician? If you ask anyone who the top mathematician is, they wouldn't have any idea.

Now this is not new. People who got to be well-known, like Thomas Edison, didn't do it because of their technical ability. Edison was smart enough that when he got his lights going, he lit up Menlo Park. He knew how to promote.

The computer industry today is full of me-tooism. You have I don't know how many different kinds of laser printers, but if you want one that does three colors, you have to spend $15,000 for it. There are plenty of gaps that haven't been filled because they're all worrying about how much they're going to make next quarter, or how they're going to make a machine as good as Canon's so they can get a little of that business next quarter. So much of the engineering is just following the tail of the guy in front of you; there aren't enough leapfrogs. Everything that comes out has five zillion clones that are the same thing. If you want to buy one, its eenie-meenie-minie-mo, who cares? You buy it on price.

[In the U.S.,] we look at how things will affect the next quarter, not the next decade. We're fighting against Germans and Japanese, who think just the opposite.

The problem is [that companies in the U.S. are] immediate-market driven, not a-few-years-out-market driven. A good product planner has to say, "What will my good customers want five years from now?" They can't tell you that because they don't know what the hell you can do!

That's what IBM did in the very beginning when we came along. They had been saying for years, "If the customer will only tell us what he wants, we'll do it." Well the customer doesn't know you can build something out of electronic tubes instead of relays, and therefore he doesn't ask for it. IBM sits there and they don't build it because no one ever asked for anything faster made out of tubes. So there it was, no hen, no egg — stalemate.

"As a nation we're more interested in how much baseball players get paid, for example. Today the salaries have gotten out of hand, and yet, what is the top salary for a mathematician?"

Then Eckert and Mauchly come along and build one out of tubes. Then IBM says they should have built one!

We developed a laser printer long before Canon and all these others. It used a gas laser, not a solid state. It got buried. The sales department gets in there and says, "Oh, it doesn't have the following 13 features." By the time you tack the 13 features on it, it doubles the price. Now they say there's no market for it, it's too expensive. Well, you can't butter your bread on both sides and not get your fingers greasy.

When a company gets more than 5,000 people, it becomes a big political mess. Evidently my skills as a politician weren't good enough. I think if I spent more time on politics and worried less about the technology, it would have made a difference. But then we probably wouldn't have had some of the technology that we did.

Univac had this damn custom of replacing presidents about every two or three years. I'd finally get under the skin of a new president after two years and he'd start listening to me, then they'd replace him and I'd have to start all over again. I think I did this seven or eight times. Just ridiculous.

The important part of what John Mauchly and I did was develop a *system*. Other people built bits and pieces, but we had the whole system. That is really what I was good at, the systems approach. I didn't invent the electronic counter. John Mauchly really proposed the idea of a subroutine, a very vital part. And I proposed the idea of an internal memory to store programs and sequences. Those two items were the most important inventions.

Then we took existing IBM machines, existing punch cards, existing vacuum tubes and switches. . . . It was mostly standard off-the-shelf stuff, and that was the name of the game. Get a machine out fast with off-the-shelf parts, that was the name of the game for ENIAC.

I think my most significant accomplishment was the idea of internal programming, which was pyramided on John Mauchly's idea of subroutines. Most people don't realize that the Mark I [an earlier computer] had a paper tape to program it. If you had to iterate a set of values, such as you did in a trajectory, and iterate the same calculation over and over again 200 times, you had to type out the instruction code 200 times along this straight tape. If we had built the original ENIAC without the subroutine idea, it would have taken a million tubes instead of 18,000 to do the programming. So it was a necessity in our case to start off with a more economical scheme.

Later, I was told that [Charles] Babbage and [Ada] Lovelace thought of this idea, too. Fine, but they didn't get it off the ground. Some guy thought of the light bulb 40 years before Edison did, but he didn't build it.

Today's computers are faster and cheaper and have a lot more memory, but it's mostly more of the same. They aren't really a hell of a lot different from what they used to be. They're still internally programmed.

The human interface to the computer is such a big part, and I think almost nothing has been done on it. I think we'll see more on voice input, but that's limited, too. You may have to get everyone together and set up a group . . . and that may be an area where the government should get involved.

We are still stuck with the QWERTY keyboard, even though Dvorak keyboards are faster and there are probably even better

"[In the U.S.,] we look at how things will affect the next quarter, not the next decade. We're fighting against Germans and Japanese, who think just the opposite."

schemes. There are probably keyboards where one plays chords, like a piano.

Some people say the QWERTY keyboard was laid out the way it was because the [typewriter] mechanisms jammed if you hit things too fast. So it's deliberately designed to slow you down.

The icon-based interfaces will sell, there's no doubt about that, but I think they're an impediment once you've gotten going. I find that I can do things with a keyboard faster than I can poking around the screen.

A lot has been written about how computers haven't helped with productivity. I think there's a good reason for that, and it's fairly predictable. The more you can do with a machine, the higher you set your sights. So it's a self-defeating proposition.

People used to come to me and ask, "Can a computer think?" And I'd say no. Then I'd say, "If you could play a game of checkers with a computer, would that be thinking?" And they'd say, "Oh sure."

The problem is that every time you solve one of these problems, someone then advances the definition. So then they say, "Well, playing chess is not thinking, that's something else." Whatever level you set the thing at, somebody is going to raise the ante on you. You're never going to solve it when the definition is floating like that.

A lifelong Philadelphian, the 72-year-old Eckert is retired and lives with his wife in the Philadelphia suburbs. He still consults for Unisys and is involved in a number of business and technology ventures.

Eckert traces his interest in electronics to a boyhood fascination with the family radio.

When did I get interested in electronics? My mother saved some menus from when I was five years old and we used to go to a [restaurant] in Atlantic City. While we were waiting for the service, I was always drawing pictures on [the menus]. That was how you kept kids quiet.

We had recently acquired a radio; it had three dials and five tubes, big batteries, an antenna, loudspeakers, headphones ... it looked like a big horn, and I was utterly fascinated by it. So a lot of the pictures I drew were pictures of that radio, with the loudspeakers and wires and all ... in some detail, with notes coming out of the loudspeaker. So I was pretty impressed with electronics at five years old, and I continued to be impressed with it as time went on.

Philadelphia and Camden were the center for electronics when I grew up. Forty percent of the radios in the U.S. were made by Philco at that time, 20% by RCA — Atwater Kent, Dave Grimes and a few others each made about 10% more. About 90% of electronics as we knew it then was right where I lived. I used to go over to Farnsworth Electronics in the afternoon after high school and help them wire stuff up. As a kid I just adored these guys. ... What more motivation do you need? I was in the right place at the right time.

If I wanted to invent a semiconductor today, I can't get a dozen guys and a garage and a soldering iron and start something. To build a semiconductor plant costs anywhere from $10 million to $25 million. So doing things today, experiments, are at such a different scale. ... I think the Japanese are showing that [the cost] almost has to be shared by the government.

Get smart

I'm not sure that giving everyone the education once thought proper for an English country gentleman is the proper way to solve problems in the modern world. All of education needs to be thought through again.

Certainly the ability to speak English and do elementary mathematics is important, but beyond that, I think we need to reassess ... even in history. The big sales pitch for teaching history is the statement that those who fail to know the mistakes of the past are condemned to repeat them.

Well, I don't think the future is going to look like the past. All the studies of wars and human relations between nations could not have predicted what happened in Russia recently.

There are things in science, engineering and technology that are more important these days. Scientists and engineers in Europe are considered more important to the country's future than they are [in the U.S.]. We've become worse at this rather than better.

I have one fault with the way math and science are taught today. I get more enthusiastic about these things talking with people who know the history of how this stuff was developed.

When we teach [science], we don't mix history in, so nothing gives rise to the exciting things that have happened in its past. We should make it more human.

Photography by Nick Kelsh

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HOMESPUN BILLIONAIRE

H. Ross Perot

From his 17th-floor office in North Dallas, H. Ross Perot can see the formidable array of buildings that make up the headquarters of Electronic Data Systems Corp., the $7 billion computer services powerhouse he founded in 1962 and sold to General Motors in 1984 for $2.55 billion. Although the view is compelling, the billion-dollar businessman rarely gazes out his window. He chooses instead to look ahead, anticipating challenges for his numerous businesses, including computer services firm Perot Systems, and upcoming presidential campaign.

Four-year-old Perot Systems, on a run rate in excess of $200 million this year, competes with EDS, Andersen Consulting, Computer Sciences Corp. and IBM for ever-thicker slices of the outsourcing pie. The company counts Nation's Bank and American Medical International among its blue chip accounts.

Despite his gritty manner, the 62-year-old former IBM salesman is a humble, homespun guy. He lauds his handpicked executive team for Perot Systems' early success. In fact, Perot credits former EDS President Morton Meyerson — who recently replaced Perot as chairman of Perot Systems — as the force that jolted that company from the industry's fringes in the mid-1970s to its epicenter in the mid-1980s.

THE COMPUTER SERVICES business, prior to EDS, was the service bureau business, where you did payroll and small jobs for little companies, and a big customer may have paid you $500 a month. The first job we ever sold at EDS was $5,128, at Frito-Lay. The next one [was] $10,166, and it got bigger from there. When you look at the size of the contracts now, that helps give you a sense of how things have changed since then.

EDS was the first company that agreed to do a complete information services job at a predetermined price on a predetermined schedule and then sign a long-term operating contract at a predetermined price. In an industry that basically had always sold the elements, we were the first company to sell a result: an operational system with the customer knowing what he was going to pay and what he was going to get. It was very unconventional. When I had the idea and took it to IBM, they were not interested.

"Too much money dulls the wits of people. To tap the full potential of people, you need to offer them incentives, but not just money."

Anyone could have done what I have done, but it's good ideas that make you successful. Ideas have come to me in very strange and odd places. Much of the reason EDS was successful was because of Mort Meyerson. Most people don't realize that he was running the company for the last 10 years that I was there. I've been fortunate over the years to surround myself with good people who had good ideas. [Today,] computer services is an idea whose time has come. More and more [companies] don't want to be distracted by areas that are not directly related to their core businesses, their customers and their markets. The best analogy I can give is if you could have an electrical power generator plant for every company. It's more cost effective to buy electricity from a public utility. I don't think [outsourcing] is a criticism at all of IS management. We're reducing the costs of producing the information and improving the quality. So you get higher quality at a lower cost.

Having IBM enter the business [through its Integrated Systems Solutions Corp.] dramatically expands the business. It's a new awakening, the "in" thing to do. We can thank IBM for that. I'd like, as the founder of EDS, to take credit for it, but pragmatically it's like the pope blessing the idea when Big Blue decides to get into business. It's politically correct.... That's good for the market.

Sure there will be Japanese competitors [in computer services] over time. They're tough, organized, resolute, purposeful people, so they'll probably turn into good, effective competitors. My frustration with America is that the Japanese are our rivals, not our enemies. Let's assume my toughest competitor 10 years from now is a Japanese company: They're a rival, not an enemy. I'm not going to hate them.

It's fascinating to build a new company [such as Perot Systems]. In 1988, we started with a blank sheet of paper and built a company. I took with me the best people [from EDS], many who worked with me for more than 15 years. In 1962 we started [EDS] and there was no market. Today there's a large market. In those days there was IBM hardware and an operating system, and we were brought in to make it work. Today it's much more than that.

[However,] the same old ground rules apply: You've got to solve the customer needs. It's not a function of how much you spend. If that were the case, we could outspend almost everybody in the business because we have resources to do it.

Even though we have resources, we keep money in short supply. Too much money dulls the wits of people. To tap the full potential of people, you need to offer them incentives but not just money.

How do you build a best-of-breed company? In my humble opinion, it's basic stuff. You must build a firm with moral principles. If anyone in my company mistreats someone else in the firm or advances at the expense of someone else, I'll have them called in to face me and I'll fire them myself.

We have a very clear vision of what the future holds for Perot Systems, but we don't talk about it. Will we do an IPO? Not as far as I'm concerned, but I'll leave that up to the guys in the company. I don't see any urgency. If they get excited about it, we'll do it for the same reason EDS went public to raise money: to create a scoreboard so everyone sees what the value of their efforts is. But once you go public, you have another group you have a big responsibility for, and that's your stockholders. Life is really simpler when you're private. You have to give your stockholders the same attention you give your customers.

These days Perot splits his time between Perot Systems and other investments managed by his Perot Group holding company, including Next, Inc. While information technology is his primary business, it's politics, education and U.S. global competitiveness that tend to preoccupy his mind.

You can have an intelligent, supportive relationship between government and business. In our country you have an adversarial, disruptive relationship. Anyone who writes the story of IBM 20 years from now will say that keeping IBM under the [government's] consent decree for many years — our government was absolutely convinced that IBM would become a monopoly — will see that IBM is [now] downsizing. IBM is starting to lose its market dominance, but it was shackled and chained for many years.

[The U.S. is] not a world leader in taking new products to market. All the technology around is not going to solve [our] business problems. International competitors have bolted ahead of us by first figuring out what their customers wanted and then delivering products.

The Japanese and other international competitors have an intelligent, supportive relationship with government. You think someday Washington will figure out that business creates jobs, creates the tax bases that allow our country to have money to spend. If the job base dries up, the tax base dries up. Japan has figured out that you have to give everyone a good job to go to work; we haven't figured that out.

Interview by Alan Alper, CW's news editor.

Photography by Phil Huber

Charles Wang

When he was 16, Charles Wang, now chairman and CEO of $1.4 billion Computer Associates International, Inc., got a job at the King Cullen grocery store in Queens, N.Y. Wang was determined to be the best cashier, so he used the time he spent stocking shelves on weeknights to memorize prices. He arrived for his Saturday cashier shift early and got the grocery bags opened and ready. He then took his position: both hands on the register and foot on the peddle that controlled the conveyor belt. The trick was to always keep the groceries moving and use both hands to punch in prices quickly. Soon he was completing orders in half the time it took his coworkers.

Wang, now 47, remembers that some customers loved him — and others were appalled at his unconventional approach.

Today, Wang still commands both respect and scorn in his drive to do things "one step better." He founded CA in 1976 and grew the firm into the largest independent software company the industry had seen until Microsoft surpassed it last year. Its growth came from a string of acquisitions that brought Wang criticism for the perceived ruthlessness of the deals and respect for being able to pull them off.

I LOOKED IN *The New York Times* [after graduating from college in 1967], and I looked at the want ads and said, "Oh my God, do they need programmers. Mom, I'm going to be a programmer." She said, "What's that?" and I said, "I don't know, but they need them — 2½ pages of classified ads."

I never saw a computer until I started programming. I'm not sure what comes first: Do you like the things you do well, or do you do well at the things you like? It's a fascinating discipline. It has enough creativity. At [the] same time, it's technical.

I don't think there's any magic [to the business side]. Venture capitalists start in right away wanting to bring in MBAs. A lot of entrepreneurs are very scared by the prospect of running a business. I don't think there's anything to be afraid of. Maybe that's part of the reason [for] my attitude. Maybe it's because we bootstrapped everything.

Wang's outlook has been shaped by his experiences as an immigrant, watching his parents rebuild a life in New York after they fled China with their three sons in the 1940s. He sees America as a land of promise but worries about its education crisis.

Seeing people who make [such important] life decisions, like picking up roots to escape communism, those kinds of actions have such an impact. You see your parents go to night school. [You see] the struggle and then the success. It gives us an appreciation for that.

I truly believe the education system in this country is a problem. [Business schools] are teaching case histories for businesses that don't function that way anymore. I think we may be missing the boat. MBA [training] teaches analysis but doesn't prepare you to make the hard decisions.

Life [prepares you for] making decisions and recognizing your biggest mistakes. I like to think mistakes I've made have been corrected quickly enough. So, hey, I learn something, so I go on.

When I look back at the first few acquisitions, I did not tell everyone on Day 1 where they stood with the company [and I] tried to run separate companies. That was a disaster; it didn't work.

Wang suggests that the publicity surrounding CA's various acquisitions, which were typically announced and then followed by an announcement of layoffs, helped create CA's image of ruthlessness. Since the mid-1980s, the company absorbed Uccel, Cullinet Software, Applied Data Research, On-Line Software, Pansophic and other smaller companies.

I think [the negative publicity] goes to all the people we acquire. What is the worst thing that can happen [to employees]? They have all kinds of false hopes. You start to build your career again, and two years, maybe three years later, you get terminated. So we tell everybody where they stand [immediately after an acquisition].

"You knew Cullinet was down the tubes; there was no magic there. If CA didn't take it over, what would have happened? We don't get any credit on that."

I know we do have a sort of ruthless image; it could be perceived that way. I think we are doing the best thing for the clients and the shareholders.

Yet Wang says the perception upsets him.

Of course it does. CA obviously is such an integral part of me. At the same time, I understand the territory we are in. It bothers me, but you can't let it eat you up. I don't work for money at this point — it's my life, and I love it.

We probably have done more to keep the software industry intact. If you think about it, the founders of the industry are floundering, and CA has been able to come along and still build value on investments that people made many years ago and built their systems on.

You knew Cullinet was down the tubes; there was no magic there. If CA didn't take it over, what would have happened? We don't get any credit on that.

We have been able to weather all the technological changes. We bought companies, we developed technologies, we're still in it today. All the others said they were going to be big, and none of them succeeded.

CA [and the growth of the independent software market] keeps the hardware companies honest. I believe we did that as a permanent sort of marker in the industry. I think we've given [customers] more options.

My theory has always been to evolve. You don't junk all these legacy systems. You have to build on them. As an industry, we must get back in touch with the real-world requirements and not stay mired in the eloquence of our technology.

We are acronymizing [ourselves] out of an industry. We're mystifying it to a point where we are losing touch with the CEO, the businesspeople.

We think the objective is to bring in a relational database management system, when the [real] objective is to bring information, address a business need for a competitive edge. I think [the reason for the industry's technology focus] is a little insecurity, self-protection. If people don't understand what we do, they can't criticize us and certainly can't replace us.

I think some technologists are forgetting who pays the bill. You're there to serve the business needs. We don't give enough credit to the blue-collar DP people that are keeping the business running. We give too much to the gurus and pundits.

Interview by Rosemary Hamilton, CW's senior editor, personal computing.

Photography by Joyce Ravid

BARRIER BREAKER

Katherine Hudson

Should a biography ever be written about Katherine Hudson, it will probably be titled *The Accidental Role Model*. In the information systems world, she's best known as the gutsy systems architect who outsourced the facilities management of Eastman Kodak Co.'s mainframe, personal computer and network installations.

But today she often finds herself held up as the embodiment of the pioneering spirit — by a very diverse group.

To the modern woman, Hudson is the model of the youngish female plowing her way to the top of a multinational Fortune 500 company, breathing the rarefied air of the boardrooms that have long been male-dominated. To the CIOs of the world, the gregarious 45-year-old general manager of printing and publishing at Kodak is one of a literal handful of former IS executives who have been promoted into the corporate ranks, in charge of a business unit. To CEOs everywhere, Hudson is the metaphor for large-scale outsourcing, having planned, then inked, $100 million-plus deals. To Robert, her 4-year-old son, she's the main squeeze.

All this from a person who sought nothing more than a quiet job teaching economics somewhere but who couldn't forget the lesson her mother taught her. "There was never anything in my upbringing that said, 'You're a woman, therefore you cannot do that.' That kind of thing was just never in the program."

I AGREE WITH those people who feel we are not seeing a significant payoff from the investments that have been made in information technology. That's because people have essentially poured concrete over the cow paths. They just layered new technology over the old ways of doing business. So what happens is the users end up just doing the old work a little faster. But they aren't necessarily working smarter.

Here's an embarrassing example that happened here [at Kodak]. They put in place a little PC system to track invoice errors to replace a manual system. The fundamental question should have been: Why do we have those invoice errors in the first place? Why not invest in a system to eliminate the errors? That would mean studying the invoicing process closely as a first step.

There are probably more MIPS in the world than we can use in the next 20 years, but am I using them to do the right stuff? If you really examine the way managers manage, you might find that little has changed in the last few decades. The issue today is having to go through a potentially traumatic re-engineering exercise.

When you look at other technologies in other industries, you realize how new IT is. In that sense, we're just entering the phase when you should start to see the payoff. We're just getting the infrastructure in place. You've got to get talented people in there now and build it up.

Here's where the problems really lie: The United States is probably in the situation it's in, competitively speaking, because it wasn't thinking long term. If you look at the economic history of the country through the '80s, you see things moved along the lines of a lot of specialization, so it was OK to have a lot of islands in manufacturing because there was not a big premium on cycle time.

Now there is. Now we have to have a seamless flow of information. I can imagine a time soon when, five minutes after I buy a pair of Levi's at JC Penney, someone in a Levi's factory in the Far East will pick up a ball of thread and begin making a replacement pair, thanks to LeviLink.

But in a short time, another manufacturer can copy that communications technology. There's increasingly little real advantage, or at least none that lasts long, in technology. The advantage gets down to people.

And education. This is a major issue. There are huge systemic problems in the U.S. You can't solve the crisis in education, and that's just what it is, without talking about the federal deficit because that directly impacts the ability to fund education. Not that we should just throw money at the problem.

However, we have to go through a period of transition that will require some investment in education. The whole model by which we manage education is based on the old agrarian model. It's also based, at least it was, on this fear of communism and on McCarthyism. Like if the local people aren't controlling what's going on in the schools, the bad guys are going to come and get our kids.

Plus, the funding for education is all done locally. How do you have a poor school district just pull itself up by its bootstraps?

Education has to be on the national agenda. We need somebody like John Kennedy saying in the early '60s, "We're going to put a man on the moon by the end of the decade." And we did it. We need someone to say, "By the year 2000, we're going to have a quality education system, and we're going to boost test scores by X, and we're going to measure progress and reward those programs and teachers that achieve results."

Yeah, it's deeper than just the government. There are some groups in the country that seem to get the same message that Mario Cuomo got: The only way you are going to make it in this country is to be educated. The whole story I got from my folks, who grew up in the Depression, was that education is the answer. You go to school or you're dead meat. And you do well. That message is stronger in some people than in others.

"There's increasingly little real advantage, or at least none that lasts long, in technology. The advantage gets down to people."

By most estimates, no more than 3% of the top IS managers in the country are women, even though women populate the middle-management ranks in greater numbers and have for at least 10 years. The figures for non-IS management aren't much better.

Things are improving for women in the workplace. Maybe 10 years ago, there might have been significant questions about putting me, a woman, in the position I am in now. Not that a woman was thought incapable of running a reasonable business. But because this particular business, printing and publishing, is a traditional male bastion.

But when I was promoted [in late 1991], they didn't give my gender a second thought. So the trends are good, but the rate of change just isn't fast enough. Kodak happens to be a good place for women. That isn't the case in many other places.

When it comes to promotions, people tend to choose folks that are more like themselves. Give a group of hiring managers 10 resumes minus names and ask to have them ranked for job selection. Then go through the same process and put female and male names on the resumes. I'd bet there'd be a difference in the rankings, and it would not favor women.

Generally speaking, women still have to work harder to get the same benefits of seniority and status. If you're a woman moving up, at every job change you have to prove yourself all over again. With a man, his flow-through from job to job is perceived as a more natural thing.

I think men and women really are different in the workplace. Very generally though, men seem to be more cooperative, women more aggressive. Apparently most women read the books that tell them to go for the aorta, like when they are interviewing for a job.

On the positive side, the presence of women in the workplace makes a wider range of behavior more acceptable. In the past, you sort of had to act like the guys acted, and that narrowed the range of behavior for men, too. I would advise career women to just be yourselves in the workplace and have your own style. You won't be comfortable and therefore won't be successful with the values of someone else. But most importantly, I would tell women to make sure they deliver on what's expected from them in their jobs.

Still, I have to struggle for balance in my life. I don't think it's possible to have it all. My schedule is intense so I have to manage the requirements of the job and still pay attention to family and community. Both [my husband] Bob and I are really into our Day-Timers. We're into the concept of planning out the whole year.

In our kind of family relationship — two working professionals — the team has got to decide the priorities. We have a saying at home. It came out of a newspaper article some years ago, and in it there's this picture of me washing a truck. The caption writer must have thought I was washing Bob's truck and gave us our saying, "Mutual support is a must."

The truth is that he drives a Fifth Avenue and *I* drive the truck.

What do I want to end up being most proud of? I will be most proud of the fact that when my son Robert goes on the *Today* show at age 23 as Rookie of the Year for the St. Louis Cardinals, he says, "My father taught me the game, but my mother taught me how to hit."

Interview by Bill Laberis, CW's editor in chief.

"Generally speaking, women still have to work harder to get the same benefits of seniority and status. If you're a woman moving up, at every job change you have to prove yourself all over again."

Photography by Joyce Ravid

Edgar F. Codd

Relational database technology is considered essential for many corporate applications today, but 69-year-old E. F. (Ted) Codd recalls the irony of having to battle the IBM bureaucracy to adopt it.

Even while he was employed by IBM, the British-born Codd often felt like an outsider, trying to convince top management that relational databases were a practical — and potentially profitable — set of products. He still is not entirely satisfied with the way IBM handled the development of his most successful product offspring: DB2.

Codd first defined the relational database model in a series of scientific papers beginning in 1969. He helped to refine the model while working at IBM's San Jose, Calif., research labs in the 1970s. However, he left IBM after the company finally announced two relational products in the mid-1980s.

In recent years, he has been consulting with vendors and large user organizations to see that his dream of the relational database model does not fade.

I'M HAPPY TO see the relational database model being used because I intended for it to be useful. The only sort of working philosophy I have is that products, whether they are hardware or software, have to be of high quality.

One thing that got me into database management systems is that I attended a lecture [in the late 1960s] in which a fellow from another company was to speak about his firm's database products. He talked about it for a while, and I felt I still didn't understand his system or the power that it had. So then I asked him about predicate logic and about existential quantifiers and universal quantifiers. His answer showed that he probably didn't have the faintest notion of what I was talking about. That's when I concluded that it really was an open field.

Around 1970, IBM announced that its primary and probably only database management system product was to be [the nonrelational] IMS.

There are two purposes for [IBM] announcing strategies. One is that it's a huge company, and you've got to get people working together and working toward the goal of selling IMS.

And you've got to have the engineers who are in the development labs making systems that would support IMS efficiently.

The thing is, the top brass in a company that big cannot all be technically knowledgeable. But the guy in charge of research, Ralph Gomory, advocated pursuing the relational database — at least from a prototype viewpoint. He got the System R project moving in research, but even people in my own lab [in San Jose] were opposed to any pursuit of the relational model.

The opposition was spread over the whole company. I mean, everybody in the whole company knew that IMS was IBM's one and only database management system, and you shouldn't be doing anything to upset that. I was accused once or twice of trying to undermine IBM.

Because the relational model emerged just as IBM was preparing to ship its IMS indexed file database, the System R relational database project remained just a research project. But the mid-1970s brought new demands from large IBM sites for better database query tools, a role custom-made for a relational product, Codd says. So IBM leveraged its System R research project to develop the SQL/DS and DB2 relational databases, which were announced (after lengthy development periods) in the early 1980s.

Relational databases have a solid future, Codd believes, but they must be enhanced to perform faster and to be more openly accessible to end users. They also need to embrace new technologies, such as object-oriented programming techniques, he says.

I don't think that purely object-oriented databases are going to go anywhere. I think that a [relational] product that incorporates some object-oriented concepts could be readily marketed. But to start off with a brand-new approach is not the way to do it.

If you want a brand-new approach, you've got to have something as fundamental as the things the relational data model is based on: predicate logic and the theory of relations. People won't be willing to give up predicate logic once they know its power. It's like giving up arithmetic and accounting, and they won't give it up.

Codd believes that DB2 could be made even better through performance-enhancing techniques, such as an optimizer for improving the performance of users' database queries.

It's absolutely essential to do this because it's the way to overcome this old, old problem of input/output being much slower than electronic computing. The solution is to have a small electronic computer for every disk unit. It's cheap enough now. You can put one whole CPU on a single chip so it can manage the search and updates for that disk. I think that is the way things are going to go.

After years of battling the IBM bureaucracy, Codd has some strong opinions about the need for organizational change there.

IBM ought to be competing on the basis of today's products, how well they perform and how reliable and fault-tolerant they are. It's things like that which users are going to insist on. Open systems are synonymous with being free to choose your vendor, and I think competition is the name of the game in a market-driven economy.

IBM is [also] going to have to collaborate [with other companies]. I think they are doing it more now, and they are beginning to break the company up into smaller units that do not have to get verification or approval from all the other units. That's been the problem in the past. I think they're having a lot of problems adapting, but I think they will find out that they are doing the right thing.

Interview by Jean Bozman, CW's West Coast senior editor.

Photography by Alan Levenson

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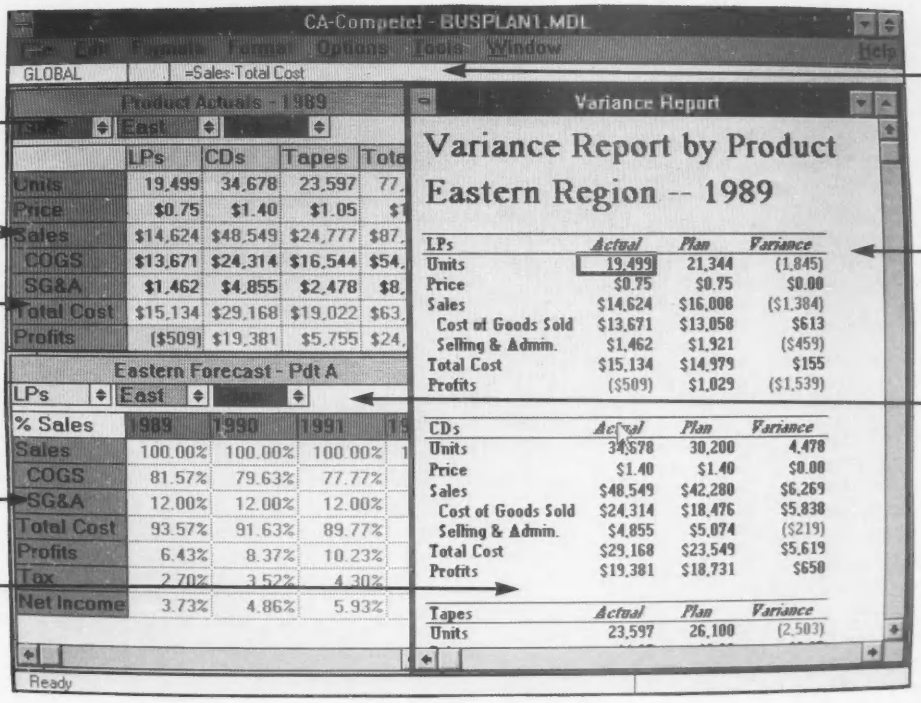

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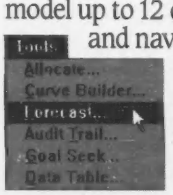

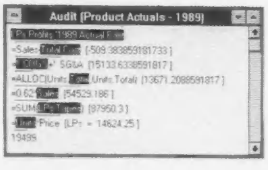

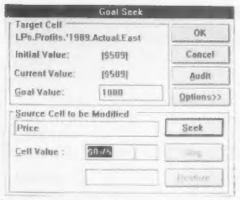

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TOOL MAKER

Dan Bricklin

Dan Bricklin has always had a penchant for trying to make life simpler — from creating easy-to-use software to wearing his trademark blue jeans and sneakers at work.

At 16, the self-taught programmer from Philadelphia landed a part-time job helping graduate students muddle through their first computer language courses at the Wharton School. Later, as an MIT graduate, Bricklin wrote applications to help newspaper editors and writers do computerized typesetting with as few keystrokes as possible.

But his first taste of big success came when, as a graduate student at Harvard Business School, Bricklin elected to make life easier for himself. That's when he came up with the idea for VisiCalc, the electronic spreadsheet that proved to be the springboard application for the personal computing revolution.

Some reports say Bricklin, who will turn 41 this year, could have been worth as much as $200 million by now if in 1979 he and partner Bob Frankston had patented VisiCalc.

Bricklin didn't get that patent. Is he bitter? Surprisingly, no.

WE COULD HAVE patented VisiCalc. We actually looked into it way back when, but . . . it was very difficult to get software patents [before 1981].

In hindsight, it would have been very bad for the industry because we never would have licensed it to others to develop. We wouldn't have had a 1-2-3 or Excel today. . . . Innovation would have been slowed. I would have been substantially richer, but I don't think that would have been good for the industry nor necessarily good for me.

In terms of the success of VisiCalc, I don't feel I have to repeat it. But it is nice to be able to realize you've done something very worthwhile.

I knew we had "arrived" with VisiCalc [when] *The Wall Street Journal* had an editorial about the new [federal] budget, and it said something like "All over Washington, yellow legal pads were out, and VisiCalc spreadsheets were grinding away to figure out what this meant. . ."

The inspiration for VisiCalc came from Bricklin's experiences as a frustrated Harvard Business School student. He was prone to errors when calculations involved a series of numbers.

I had my little TI Business Analyst calculator, and I'd make mistakes. If I had an error, I'd know that all of the rest of my calculations would be wrong.

For some [homework assignments], we'd run off to the computer center. There was one guy there — Alan Backus — who had a programmable calculator, and he could always get the answers faster than I could writing a Basic program. And that was kind of galling. Here I had this big PDP-10 . . . and it was quicker to use his little programmable calculator.

Since I knew about microprocessors, I imagined, "Why not use computers to remember the calculations you did and recalculate?" I'd visualized it as a word processing type of thing.

The original daydream was I'd hold my calculator in my hand. . . . It had all the alphabetics and numerics on it, and it had a mouse ball on the back. You'd sit there with this calculator. . . . You could move it around to point, and you could key in labels and numbers. You could circle numbers and say, "Take these and put the sum over here." It would be a live sheet.

I daydreamed about that a bit, and said, "Why not try prototyping it?" When I did the first [VisiCalc] prototype, I said, "The easiest way to do things is to name them by a big grid. That's the way a columned spreadsheet works."

I was very concerned about minimizing keystrokes. Why? I came from computerized typesetting and word processing [from a stint at Digital Equipment Corp.] where people were paid by the keystroke. We used to spend hours arguing over exact placement of keys. . . . Speed was of the essence and . . . you wanted to make it as easy as possible.

I was of that mentality of minimizing keystrokes and did the same thing in spreadsheets. Also, I knew I was competing against the back of an envelope.

For its day, VisiCalc's user interface was a model of simplicity. Bricklin continues to have a passion for creating things that are, above all else, useful to lots of people.

When I look at the things that I wished I had invented, the one I've always said is the Ziploc bag. It is so simple and so useful.

There is a Jewish parable that says when God made the world, he made it a little bit incomplete so that rather than make bread, there is wheat so we can bake it as bread. And rather than the earth being made of bricks, it is made of clay so that we can make bricks. Why did he do that? So we can be partners in the act of creation.

That's a wonderful story. I've always liked creating things and putting things together. And that's what has been driving me. I like products that people use. I've always liked doing that. The fact that I lucked out and had a product that had a major impact and a lot of people used it makes me feel good.

"When I look at the things that I wished I had invented, the one I've always said is the Ziploc bag. It is so simple and so useful."

Now, Bricklin and VisiCalc co-creator Bob Frankston are teamed up once again at Slate Corp., trying to develop applications for pen-based operating systems from Go Corp. and Microsoft Corp.

In essence, Bricklin is starting over. Slate is a lean environment, right down to Bricklin's spartan office in a nondescript brick building tucked behind a Chinese restaurant and a lumberyard in Newton, Mass. Bricklin's goal for pen computing is as simple as it is ambitious: Create applications that are "as good as paper and better."

The paper that we have today is the same thing that we had before — we write on it. But there is no reason why the medium of paper can't turn into some electronic thing. Already we don't really mail paper — we mail an electronic image of paper to people via the fax machine. And that is accepted. So why not get rid of the whole thing and leave it electronic?

What you can scribble on paper you should be able to scribble on the computer.

People talk about computing at their homes: "This is our computer corner." But you shouldn't have to go to the computer. Computing power should be with you. What I'm envisioning is something around the size of a book, about 8 by 10 inches... with a back-lit color display. The thing feels like leather or like those cameras that have a sort of rubbery feel to them.

People say, "I'll never read on a computer because I can't cozy up to it like a book." Well, the old good books were bound in leather. There is a reason for it — it feels good to hold in the hand. You could actually read in bed with this computer without disturbing the person next to you because the screen is lit up. It will also have communication in it, so that if I'm reading something that might interest you, I can just circle it and flick it off to your machine.

The things I am talking about will be commonplace at a very low price shortly. Home use, cheap, small? Yes. I've talked to enough hardware manufacturers to see that that is going to happen. And that is going to be a very personal computer.

Interview by Alan J. Ryan, a CW associate editor, features.

Photography by Alan Levenson

Bricklin on multimedia

Computers advance by having new capabilities. Period. It isn't just by making them bigger, smaller or faster. Sound and voice input, sound output, bitmapped displays . . . open up new worlds.

When there are computers that come standard with a video image camera or a scanner . . . that will change what we think of as computing.

Multimedia is important because it lets us get information across in a better way. The more information we can provide, the better. You are trying to get what is in one person's head and move it into somebody else's head.

The problem is authoring tools and people who know how to do it. Multimedia is just a medium for creative people to get the idea across. I can give you a great graphing tool, but if you don't know what graph is the right graph to show your idea, it is useless. We need to develop shortcuts in multimedia.

Then there are a whole lot of copyright issues . . . a lot of property issues. When people are producing electronic memos in multimedia, and they want to use snippits they've captured off the TV, etc., who owns what? How does the owner or creator get paid? Should they? How valuable is it? These are incredible issues we have to deal with.

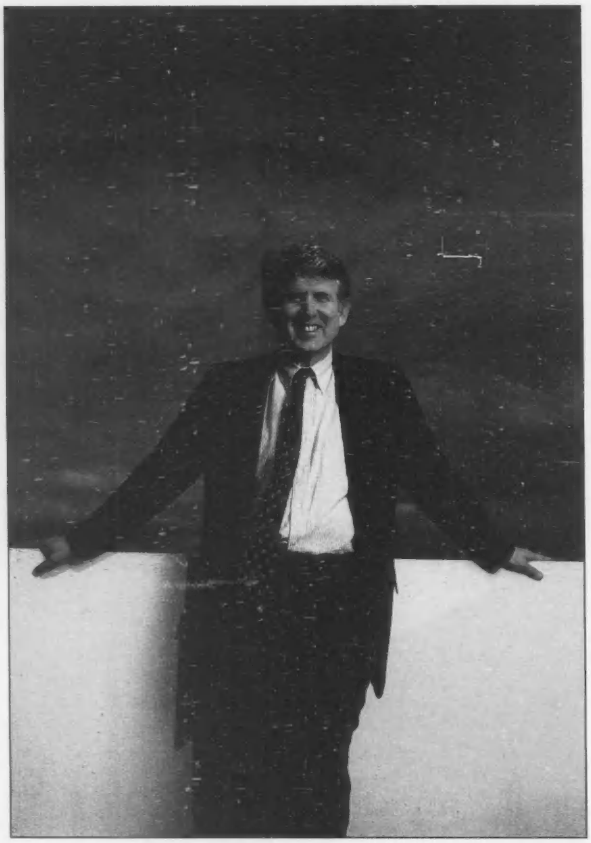
Robert Metcalfe

Twitted by some as the "Etherbunny," the amiable Robert Metcalfe helped to ignite the desktop revolution 19 years ago by inventing Ethernet, which today connects about 10 million computers.

At 46, Metcalfe is a study in contrasts. Routinely lauded as charismatic, he's no robo-diplomat. Easygoing on the surface, he is so intense that his last three years at 3Com Corp. left him on the brink of an ulcer.

Metcalfe once defeated the purpose of an off-site, team-building exercise that involved co-workers coaching one another across rope bridges at various levels above the ground. He not only started out on the highest bridge, but he refused to take advice from anyone but the instructor because, according to former 3Com CEO Bill Krause, Metcalfe assumed that only the instructor knew more than he did.

Krause, who worked with Metcalfe to build 3Com into a $400 million company, sums up his former deskmate as "the Robert Redford, boy-genius, rowing coach of MIT." Metcalfe, who boasts a satchel of degrees and teaching posts, also founded 3Com. He got his start as a technologist at Xerox PARC, building the Star workstation and co-inventing the first LAN and laser printer.



MY INITIAL ASSIGNMENT at Xerox PARC was to put Xerox on the Arpanet. The principal use of the network was laser printing. Ethernet was designed to do this and to hook up PCs that weren't built yet. David R. Boggs, then a grad student, and I spent two years as the Bobbsey Twins and built a 100-node Ethernet. While there, I also helped to build the first laser printer.

I like to build things and make them work. I'd like to be remembered as a farmer and engineer, rather than as a hunter and a killer.

Unlike many people that I know, I went to college all the way. I finished it, and I didn't skip any grades. I was always near the top of my class, but "boy genius" is just a little too strong. I was 27 when I invented Ethernet in 1973 — that's not young to have an invention.

The most important achievement of my life, besides selling the industry on Ethernet and launching 3Com in 1979, was that in the two years I was vice president of sales and marketing at 3Com, I got sales to go from zero to $1 million in a month. I had to sell the industry that it was worth it to spend the additional money to buy a standard, that it was worth it to give up minis and switch to networks and PCs.

I was the networking guy among the PC revolutionaries who moved the world to the next step in the progression of computing: mainframes to minis to PCs.

During his 11 years as an executive at 3Com, Metcalfe had to grit his teeth and defend a multitude of 3Com decisions he violently opposed, most notably selling Token Ring LANs and getting into LAN operating systems. 3Com joined with Microsoft to build LAN Manager, an ultimately unsuccessful alternative to Novell's NetWare operating system.

I said, "We don't have to be in the Token Ring business." And they said, "Oh, Bob, you are just prejudiced because you invented Ethernet." So I said, "That may be true, but this is a bad idea." And it was.

I was opposed to [codeveloping Microsoft] LAN Manager and found myself defending it for years on end, and it ultimately screwed the company. It hurt 3Com very badly. We underestimated Novell and overestimated Microsoft.

[The success of] NetWare was a surprise. I just didn't think there would be that much revenue in it, compared to all the other things we needed, like applications.

10Base-T was another surprise. In retrospect, 10Base-T gave Ethernet a great big kick in the pants.

When 3Com's board declined to make him president in 1990, a position he publicly lobbied for, Metcalfe resigned.

I [couldn't] break the stereotype of being the company's technical visionary to get that job. And I'm not comfortable with just being that.

I was also criticized as inconsistent — moody — in my closing days at 3Com. I'm certainly emotional and impulsive. It's one of the things I like about myself. It makes my life fun. Why else be alive? Me, I'm competitive. I feel that I am hyper and fidgety and impatient and impulsive, but I have been told a lot of times how laid-back I am. I can't reconcile it.

I've heard that I have a short attention span and that I wasn't a good manager, but I've never believed it. Jack Melchor, who was on our board and was ultimately involved with my leaving the company, would say, "Bob, you were president for a year and a half, vice president of marketing for three years, this for a year, etc. It seems like you have a short attention span."

Today, Metcalfe is very concerned that cut-rate pricing will destroy the computer industry's ability to fund research and development of new technologies. He also worries about the lag in standards.

We need to accept that there is not an infinite price elasticity for computing. It used to be true that every time you made computers cheaper, you would sell so many more that profits would increase. That appears to be no longer true. There is a very good chance that the industry is going to hurt itself with this flood of direct-mail computer marketing with zero margin.

A related problem is that the companies growing rapidly now are copycats that are not investing in applications, support or new technology, so it leaves a net drain out of the industry. We need our seed corn.

If all the sources of support and service and technology get killed, who is going to develop it? Look at programming languages. The hottest language today is C++, [which is] based on 25-year-old technology. We are not advancing [fast enough] in software as a result. There is no excuse for this.

The secret of my success is that I don't try to give customers what they say they want. I pursue the "try to take a guess at what they are going to need 5 to 10 years from now and then convince them that they need it" approach.

Interview by Patricia Keefe, CW's assistant news editor.

Photography by Alan Levenson

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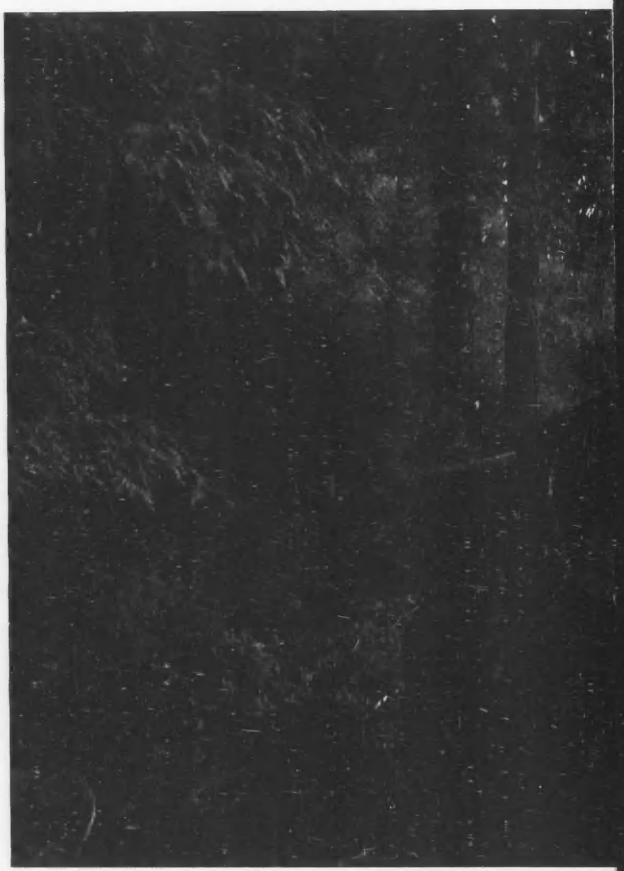
Philippe Kahn

Philippe Kahn was introduced to the world in a toga. In June 1985, *The Wall Street Journal* gave Borland International, Inc. its first broad exposure outside the computer industry in a front-page story that described a drunken Borland employee party where Kahn serenaded 600 people on his saxophone, dressed in little more than a bedsheet. Kahn grimaces when he's reminded of the story more than six years later. "It was very unfair," he says. "It made us sound like a bunch of clowns."

Maybe so, but Kahn has promoted — even reveled in — his outrageous image over the years. His bluntness has angered competitors as much as it has delighted Borland enthusiasts.

But Kahn is no clown. He has guided Borland to its spot as the No. 3 software maker by offering innovative products at low prices. Megahits such as Turbo Pascal, Sidekick and Quattro Pro have enabled Borland to persevere through some visible failures in languages, word processing and database access.

Borland has succeeded, Kahn says, because it is a company of "barbarians."



BARBARIANS HAVE HAD terrible PR. Barbarians always appear when civilizations become very decadent, like when the Romans were throwing Christians to the lions. Barbarians lived in tribes extremely frugally, didn't care about worldly possessions and thought about what was right for themselves. When groups of people start being weak they start naming as barbarians people who have ideas that are different and threatening to them. Barbarians are not horrible people. They're actually very frugal people who act on their beliefs. I kind of like to see the company that way.

We have had our hits and misses, and we survived because we're barbarians. We know how to cut our losses. Turbo Lightning [a reference-book-on-demand utility] was a great product, but it was ahead of its time. We were the first to think of acquiring intellectual property rights and delivering things like Black's book of law and *Roget's Thesaurus*. But we didn't have the resources to make it happen.

We started this company because we had to. Microsoft didn't want to market Turbo Pascal. Digital Research didn't want to market it. There was no choice. The idea was to make a good living as engineers and sell some products. I had lived with very little money before. I didn't have a lot of material ambition.

I think we've done a lot of things much more meaningful than changing [the price structure of software]. I hope what I contributed most was redefining what tools are supposed to be. Sidekick was a very novel idea — the idea of having your calendar or address book just a keystroke away. Talk about information at your fingertips. We came out with it in June of 1984, and eight years later, people are still using the original version. None of our products sold because of price.

We built the company on what we felt was right. We invented the concept of being a champion of the users. We single-handedly fought the battle of copy protection. When Sidekick came out in 1984, every piece of software was copy protected except us. Copy protection is a tax on honesty, like going into a supermarket and being body searched because there are some shoplifters. Our position was to stop this nonsense and grow the industry.

The software license agreements of that time were also impossible. So we came out with something I wrote without lawyers, called the No Nonsense License Statement. And it says a piece of software should be treated just like a book. Although you can pass it on, only one person can read it at the same time. It was very simple compared to the pages that you had to sign your life away for before.

I've always had the view that the way this industry would prosper was by instilling trust, by creating open competition, by making sure copyright law protects innovation, not monopolies.

One thing we recognized rapidly was the value of an installed base. We came up with the idea of competitive upgrades. It was like the car industry. If there was no more market for used cars, how often would you change your car? You never would.

That was the problem with spreadsheets. People who had a spreadsheet weren't going to pay $495 for another. So we said we'll let you try ours for $99. We showed that a good portion of your revenue in the future will come from upgrades to your installed base.

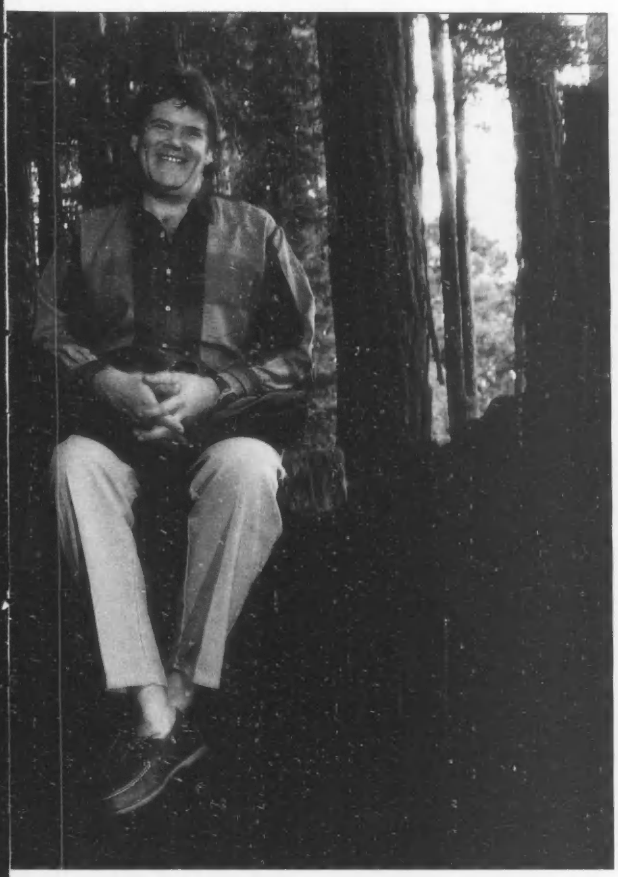
I think what [the software industry] has done best is serve an existing customer base. What we've done worst is expand the market. The market should be expanding 100% a year. And one of the reasons it isn't is that we haven't been able to entice a whole new wave of people to use computers. We haven't pushed the technology envelope enough.

The war in every organization that uses computers is between two types of software: office applications such as spreadsheets, which users tend to buy, and mission-critical applications, which are the ones built by MIS. Today, companies are making their decisions based on what the users want to drive the applications. It's a reversal [from a few years ago], and that's a fundamental shift. The mainframe is a recipient of corporate data and will always be there. The issue now is who is going to drive the standards on the desktop. MIS has to build those mission-critical applications so that they can be used with office applications.

Users should care about object orientation because historically, software companies have not revised their products fast enough. The products were buggy, and users never received enough support. Those are three areas that object orientation solves very well.

The world around you is made of objects, and it's fairly predictable. Take a glass of water and you move it somewhere else, and it remains a glass of water — it doesn't turn into a glass of wine. Then you buy a computer and you move something from

"In the 21st century we won't have territorial wars. They'll be economic. Instead of throwing armies at each other, the superpowers will throw products."



here to there, and it changes colors and shape, and you have to read a 1,000-page manual to understand it because some arrogant person on a programming team decided that was the right thing to do. Well, object orientation at the user interface level is predictable behavior from anything that appears on your display.

Technologists should run software companies. If people who run companies that produce products were technically driven, the industry would be in much better shape. There's an intimate relationship between manufacturing a technical product and its research and development phase. If at the same time you're designing a car you're also working on the manufacturing phase, the whole process gets stronger. If you give up something like this [by farming it out], you will make more money in the short term, but you will give up something very important to the research and development process. Ultimately, when that connection is lost, then a lot is lost. All the key Japanese companies that are gaining share are run by engineers or technologists: Honda, Sony, NEC, etc. That must say something.

Japan is reinforced because they do more design and manufacturing [together], and their whole industry gets stronger and ours gets weaker. American industry will only succeed if we are competitive from a product standpoint. It does not help to raise American flags everywhere we can. It helps to build better products.

Imagine what would happen if next year the quotas were that only 5% of the cars sold in North America could be built in Japan. I think it's about the only thing that could cause a revolution in America. Software is the one industry segment where we in the U.S. have global leadership. It's the most important industry in the future, and the only way that we'll stay there is by innovating.

You've already seen [Japanese advances] happen. What is a Nintendo machine but software? It starts with games because games are less sociocultural than the kinds of software we build. As things evolve, I wouldn't be surprised to see competitive Japanese word processors or even spreadsheets emerge. Have you seen the little Sony pen computing tablet? The software is very good.

In the 21st century we won't have territorial wars. They'll be economic. Instead of throwing armies at each other, the superpowers will throw products.

Computers are tools, and they have to become better tools. In the future, you'll still deal with word processing applications, but they will be completely integrated and have the ability through underlying database management capabilities to access distributed information anywhere in the world. Connections will become anywhere and everywhere, just like phone systems evolved. Human beings want to be able to go wherever they want and be free from work space, and I think it will be much more possible to do that.

Pen computing — that has a lot of potential. It's a natural thing. Multimedia is a different issue. The problem is that in an office, filming a film, editing it and such takes a lot of time. Most people just aren't going to do it.

Kahn remains one of the more accessible chief executive officers in the software industry. He receives and answers up to 200 electronic-mail messages a day and frequently handles new product rollout tours himself. Despite a workaholic schedule, the 40-year-old Kahn practices the flute an hour a day, flies his own airplane and docks his 50-ft sailboat in Santa Cruz Harbor. At 255 pounds, he is down 30 pounds from his peak, but he fights a constant battle against temptation. His executive offices feature an assortment of exercise equipment — and a frozen yogurt machine.

If I don't do something like play music or work out or fly my airplane or ride a bike every day, I can't survive. I can be creative and excited at work only if I have the chance to think about something else.

I practice [the flute] an hour a day, sometimes at 6:00 in the morning, sometimes at midnight. My studio's great because it's in the basement of my house; it has an isolation booth, and I can just lock myself in there and nobody hears me.

My new CD [Walkin' on the Moon] took us three days to record. I liked the idea of spending that time down in L.A. away from things. I have a recording company called Pacific High, but I never listen to my CDs. I can't stand to listen to myself. I hear everything that's wrong. Music is like software. It's knowledge and ideas. Who cares about what you played yesterday? That's gone. You have to do it because you like it.

The day I don't do a good job anymore is when I would leave Borland. But I have no plans to do anything else at this point. I'm doing what I think is right right now.

Interview by Paul Gillin, CW's executive editor.

Kahn's heroes

Ask Philippe Kahn who his heroes are and you won't get a straight answer. He says business is not the place to look to find heroes. His real heroes are those who take joy in living.

My hero is the guy who passes me at mile five of a 10-km road race. He's 80 years old and running with his grandsons, and he makes me look stupid. To me that's much more important [than a business hero].

If you're thinking about business, the person I learned the most from is [Novell's] Ray Noorda. He's one of the guys in this industry I could work for. He's been able to turn a small company into a major powerhouse by establishing the right relations and being a gentleman about it.

From a technical standpoint, one of the guys I admired the most as a kid was my father's best friend, Theo Williamson. He was the inventor of the hi-fi amplifier and a member of the British Royal Academy of Sciences, and I learned a lot from him.

As a person, my mother Claire was the person I admired the most. She was a hero of the French resistance and spent time in a German concentration camp but survived. She was one of the first women I can remember with a job. She was poor, but she led a great life.

Photography by Alan Levenson

Alan Kay

Alan Kay isn't really all that interested in computers per se. What does interest him, and what has driven him to challenge conventional wisdom about what computers are and how they work, is a passionate interest in human development and the way our minds work.

Expanding literacy — not just access to knowledge, but the power to use it — is what his research is all about. That's what he was after when, in his late 20s and early 30s, he headed up a team of young mavericks at the Xerox Palo Alto Research Center during the 1960s, working on user interface concepts that eventually found their way into the market with the Macintosh. That was also his goal when he invented the Smalltalk object-oriented programming language. It's the grail he's still pursuing more than 20 years later as a fellow of Apple Computer, Inc.

A primary project these days, when he isn't teaching graduate students at MIT or huddling with Apple Chairman John Sculley, is learning from the students in a Los Angeles magnet school about how computers can be usefully employed in an educational setting.

Appropriately, Kay traces his concept for the Dynabook — a precursor of notebook computers and the "intimate computing" that may be just ahead — straight back to another roomful of children . . .

THE BIG HIT for me came from seeing a number of things simultaneously back around 1968. I had done an early desktop computer. I had read McLuhan. Then I saw the first tablet-based system at Rand Corp. and the first little flat-panel display at the University of Illinois. And I visited Seymour Papert's lab.

That display was a revelation. But I think it was my visit to Papert [developer of the LOGO programming language for children] that really did it, that set off a kind of rotation in my thinking. Somehow it was seeing the children working in an environment designed for them, doing things that, up until then, only adults had done, that started me thinking about computers as a medium and the need for an easy user interface.

I never thought of computers the same way again. Because all of a sudden, Aldus kicked in.

I think I first read about Aldus in 1965, when I was trying to understand McLuhan. This was Aldus Manutius, the Aldus of Aldus PageMaker. He was the one who decided that books should be the size they are today — not big things like the Gutenberg Bible — because then they would fit into a saddlebag.

Making a small book did not seem that significant to me in 1965, but it became significant to me later when I saw Papert's work. That's when I was struck by the idea that the computer isn't a vehicle, which was the way I had been used to thinking about it, but a medium. That was when I first understood that the big hit in printing wasn't the Gutenberg Bible, but the portable book with many titles, and that's when I realized that the desktop computer was going to be a passing phase.

You can think of what's happened with computers in terms of what happened in printing. First there was a manuscript culture, which included a few thousand people. Then there was the Gutenberg technology, which involved thousands more. Then [came] the Aldus Age, which actually started extending literature into a large part of the civilized world.

At one point, Larry Tesler and I — Larry worked for me at Xerox and now he's at Apple — came up with a table that described the characteristics of the three paradigms for computers. These stages are all very different. The users are different and there are different user interface requirements. The computers are programmed differently. The priorities that determine how they are used are different and so forth. Of course, these paradigms aren't "real"; they are artificial ways of parsing out beliefs, and the boundaries between them aren't clear-cut.

The first one I called the "institutional" stage. In this one, the computer is a mainframe owned by a big company. There are thousands of users, and you can train them. The user interface is mainly about access to a function and the computer is programmed using data structures and procedures.

The second one is what I called "personal computing." This is like the Gutenberg stage. What you've got on your desk looks just like a 3270 terminal. It's a big thing, but you can own it. Not everyone can have one, but still there are millions of people using them, which puts great stress on the user interface. The job of the user interface can't just be access to functions. That's irrelevant if you can't train people. Now its main job has to be understandable, to be learnable.

The third stage I called "intimate computing." Intimate computing involves billions of people, not millions, because it is going to incorporate pervasive networking — particularly the telephone — and it is going to sell to everybody who now has a phone. People are going to do mundane things on it as well as important things.

> **"The job of the user interface is to learn from you. It has to find out what your goals are, so it can dispatch agents on your behalf."**

The strain on the user interface is greater than ever before. The Mac-style interface won't work because now we are connected up to possibly trillions of potentially useful objects that no browsing, direct-manipulation interface will ever be able to help you find. So, right away, we have to have semi-intelligent software agents that can help us find resources on the network and carry out other goals. And now, the job of the user interface is to learn from you. It has to find out what your goals are, so it can dispatch agents on your behalf.

When I went to Apple in 1984, I went there not to help them with the Macintosh, which was what we did at PARC 10 years before, but with the express purpose of trying to get them to go on to this third phase.

What's still frustrating is not having rounded off some of the things I was thinking about back in the '60s. We still don't have a tool for "writing" that is commensurate with the Macintosh interface. What you get when you get a Mac is something that you can "read" fairly easily, but we haven't come up with anything that makes creation as easy.

I think there are three parts to literacy. You have to have the tools to be able to access stuff made for you by someone else, like in reading. More important than that, though, is a set of skills for creating stuff and sending it back out to the thought stream of the culture — what you do when you write. I'm more concerned about the hundreds of millions of people in the U.S. who can't write than the 23 million to 50 million who can't read. People who only read are still basically disenfranchised from any kind of Jeffersonian view of democracy. The third part has to do with an understanding of styles and modes of thought.

In terms of coming up with easy but flexible "writing" tools comparable to the Macintosh interface, it has been 20 years and we still haven't dropped the other shoe. I think we are actually only a couple of years off, though. . . . I don't mean me, necessarily. There are other people working on this who are pretty close.

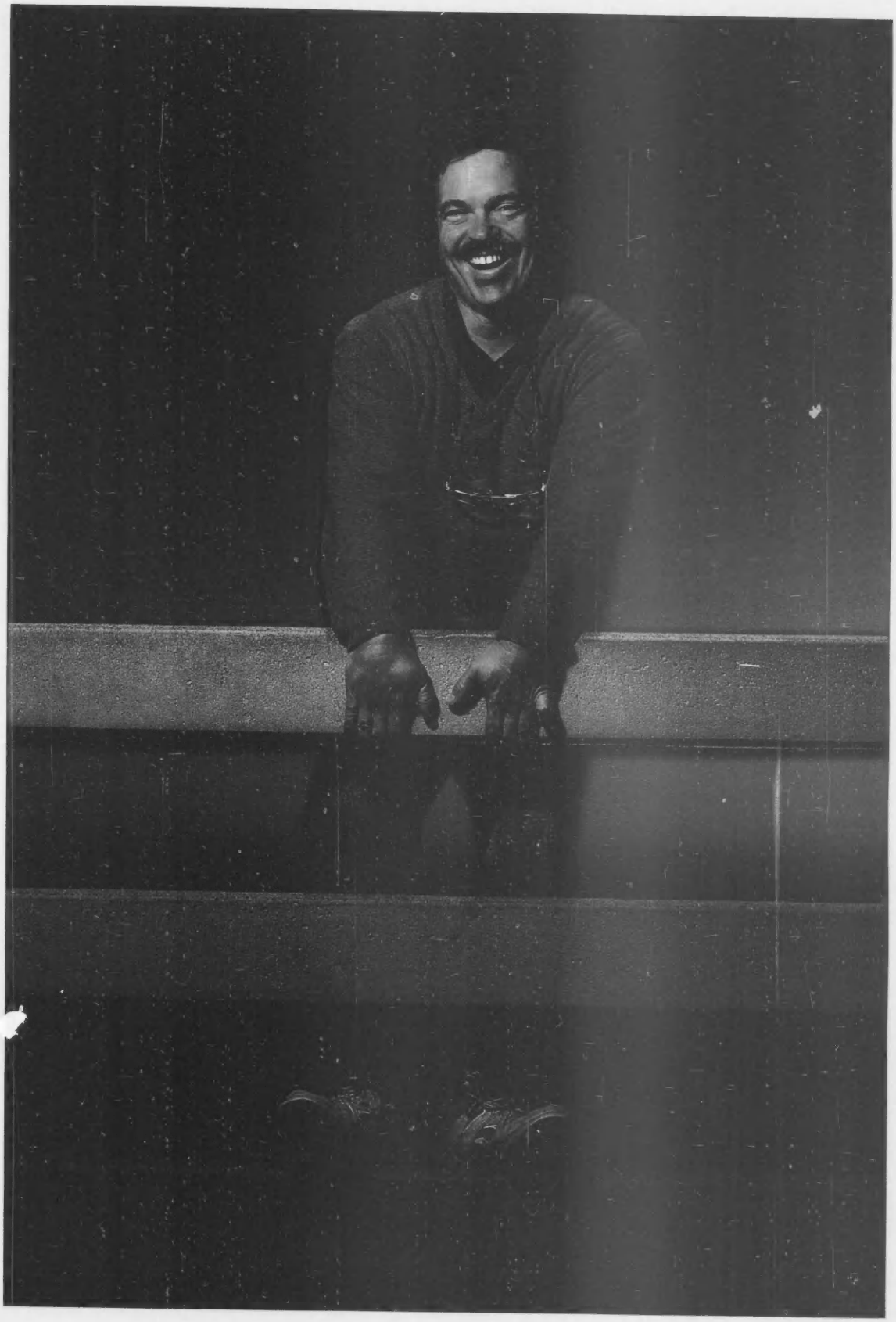
Anyone who invents media these days has to do it in a more self-conscious manner than we did in the past. Television was probably the last medium where you could say, "Let's not shoot the people who did it because they knew not what they did." Now we do know. We know that media are not neutral. They tend to enable some modes of thought at the expense of others.

I'll also be interested in seeing when and if anything really powerful will be used commonly in business. Business has made tremendous use of communications technologies for transporting goods and ideas around, but it has made hardly any use at all of modern modes of thought.

American business is like little tribes of hunter gatherers. We're not wired for understanding complexity directly. We're basically wired for dealing with charges of animals and going after fast-moving food. We love excitement, and we can't deal with abstraction.

One of the examples of the use of technology that we've seen recently is program trading on the stock market, which is a bloody disaster. You get past those magic little thresholds and all of a sudden there will be a flood of sell orders. Most things that I have seen in American business are remarkably like that. There is this tendency to treat things that are really parts of larger systems as small isolated problems. They don't realize that there are all these ecological feedback loops, so they just do a little part of it, pull the string and the whole thing starts unraveling.

Interview by Joanne Kelleher, CW's features editor.



Photography by Alan Levenson

Bill Gates

"A COMPUTER ON every desktop in every home" were the words that Paul Allen and I wrote when we started the company in December 1974. That's still sort of the driving vision behind the company. We're maybe a third of the way there. The home is difficult, and that's why you see our huge investment in multimedia and some of the relationships we've had with firms in Japan that have the technologies that will have an impact there.

The most dramatic contribution we made [to computing] was creating a 16-bit standard for personal computing, convincing hardware companies worldwide to build around a 16-bit standard. Until we had 16-bit computing, the size of the software industry was tiny.

"We believed that working with IBM would make the thing a success no matter what. We've certainly come away from that view."

ty-four years ago I sat down at a computer for the first time, so that's [how long] I've been in the business.

"Gates has clearly won . . . and free-wheeling innovation in the software industry has ground to a halt."

— *Mitch Kapor, quoted in* Business Month, *November 1990*

Desktop computing was ushered in by this idea of a standard system. Our other big contribution has been moving up to graphic interfaces. The next stage will be the more powerful object-oriented operating systems we're building.

Even in the 10-year time frame, computers will be very pervasive. Flat-screen technology, wireless communications, compressed audio and video, optic fibers being wired will make information at your fingertips a serious part of the business. People expect these tools to be on their desktop and wherever they go.

You get out 25 years, and it'll be more than just a passive information network; you'll have computers seeking out information and fiber-optic communications to the home. Whether it's calling up pictures that you've taken or sending pictures to your relatives or calling up movies or using interactive materials to learn, this will change education.

A lot of industries won't be separate in the future. What's cable? What's the post office? What's Federal Express? What's a TV network? These all have something to do with information-on-demand capabilities. Twenty-four years ago I sat down at a computer for the first time, so that's [how long] I've been in the business.

That's one of the more ludicrous things I've ever heard. When it comes to a standard language, standard operating system, multimedia, portable computing or commitment to the Mac, we've certainly done more innovation than any other software company. Over half [the commands] in the first Basic had never appeared in Basic before. Name an 8-bit computer, and we did the software for it.

[Sticking with things] has been characteristic of our great successes. There have been a lot of cases where others got in early but didn't stick with it — Vision from VisiCorp or even GEM from [Digital Research, Inc.].

The idea that computer manufacturers would all want the same operating system so we could sell microcomputers in high volume and have lots of competition was not widely accepted. Yet the industry we have today is based on that very idea. We've been behind things that took a lot of perseverance that [today] are key to where the industry is going.

Software lends itself to having tens of thousands of companies because of the wide variety of titles and the specialized knowledge it takes to get those titles out there. You want to have some companies taking a long-term approach, that can fund a research group, [and] can represent the U.S. on a worldwide basis. Microsoft is among the leading software firms doing that.

Microsoft Windows, in retrospect, was ahead of our time, almost [in] a dangerous way. To be frank, the main thing we were ahead of was the capabilities of the hardware. If you look at Windows now, it's not that we've evolved to be more graphical, it's [that] the capability of the chip and the resolution of the screen [have improved].

OS/2, on the other hand, in relation to its development costs, is the biggest disaster the software industry has ever seen. Between IBM and Microsoft, we lost more money on that than any software project I've ever heard of. The whole feature set was driven by IBM wanting to have its Extended Edition — very SAA mainframish things instead of things for desktop users.

Joint development with IBM was full of challenges. [I learned that] to get features into the marketplace, you can't have these huge leaps where you have to buy a very big system and do new things. Evolution is more appropriate. Also, we believed that working with IBM would make the thing a success no matter what. We've certainly come away from that view.

[IBM no longer sets standards alone.] It's defined through the competitive marketplace. Our share of desktop software is higher than IBM ever had share of anything I know of. [But] IBM can still set standards.

We could get back together [with IBM]. We continue to work with them. We've got some issues with IBM because they've resisted the popularity of Windows compared to other manufacturers who are designing their hardware to be great Windows machines.

Although Microsoft is his obsession, Gates cultivates an active interest in biotechnology. He demonstrated that recently by donating $10 million to the University of Washington to create a biotechnology department.

Other than computers, biotechnology is changing the world more than anything else. It has the potential to solve many of the world's diseases. But I still think computers will have a bigger effect because they can capture the curiosities that people have at a young age and have an impact on education. [Biotechnology is] exciting, but it's a hobby. I've picked my career.

In 10 years, I'm sure I'll be in an active, contributing role [in the industry], but in 25 years, I'm sure the reins will have been passed. By then I'll be trying to give away whatever money I've left.

Interview by Paul Gillin, CW's executive editor.

Gates' heroes

There are a lot of scientists that I like. [Nobel Prize-winning physicist] Richard Feynman was an incredible person. The thing that's singular about Feynman is that he thought everything through for himself. He wanted everything to be totally clear in his own mind, and he was totally independent. He also was a playful, happy guy who enjoyed what he was doing and brought that sense of intelligence to the goofy things that he'd do.

In more recent times, the word "heroes" is a little strong. I admire a lot of people who are around today. Mitch [Kapor] has been willing to criticize me, but he's a good guy. [Steve] Jobs has done a lot. Working on the Mac was one of the more fun things I've ever done.

Ken Olsen has done an amazing amount. He's persevered through ups and downs, driven things forward and had a commitment. DEC has had the challenges of a changing industry, but when you look back on what he did, it was very impressive. I actually grew up on a DEC computer, studying the operating system and learning the language on a DEC PDP-10 time-sharing machine.

Photography by Alan Levenson

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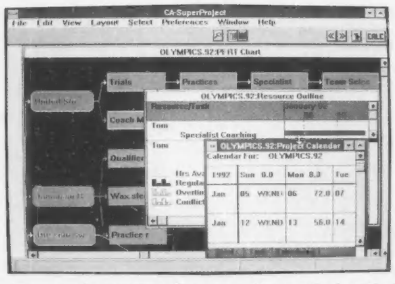

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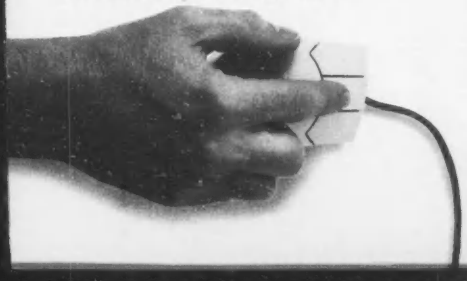

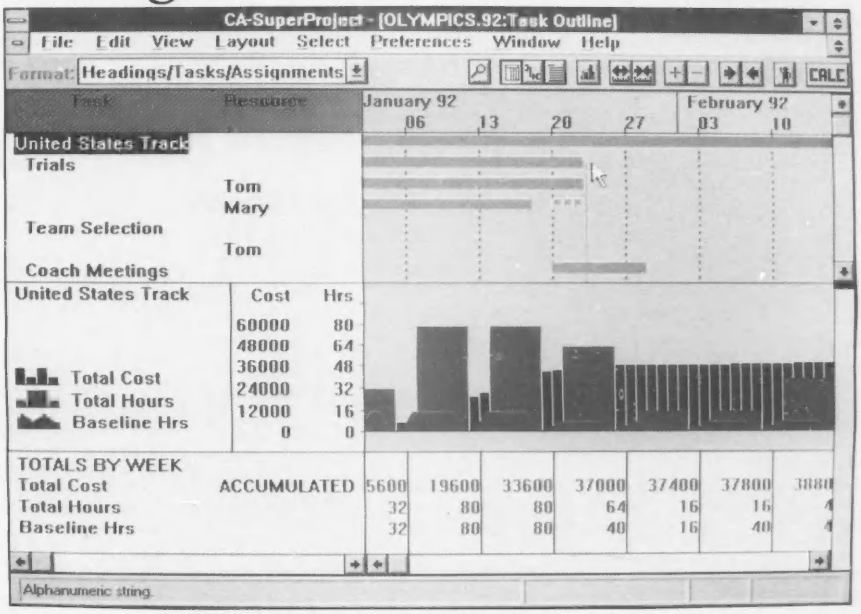

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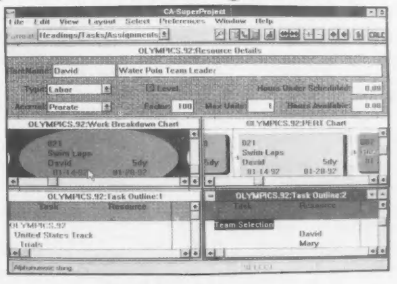

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MONOPOLY SLAYER

Bill McGowan

When we interviewed William G. McGowan earlier this year, his office on the 12th floor of MCI Communications Corp.'s office tower was littered with books, magazines, stacks of folders and the week's management reports delivered by electronic mail. The office was more cluttered than usual because it was one of the last executive suites to move to MCI's new headquarters in Washington, D.C.

But McGowan, who had undergone a heart transplant in 1987, did not get to use his new office for long. He died of a heart attack June 8 at the age of 64, just as this special edition was going to press.

Since playing an historic role as the catalyst in the 1984 breakup of the Bell System monopoly, McGowan had built MCI into a $9.5 billion business and the nation's No. 2 long-distance carrier. Always immersed in public policy debates and market share wars, McGowan also demonstrated a no-nonsense understanding of how the intertwining of data processing and communications has changed the world.

Through it all, the craggy-faced McGowan never lost his knack for delivering a well-aimed jibe at AT&T, Congress and federal regulators. For one thing, he found the seat of government embarrassingly ill-informed about the country's telecommunications infrastructure.

WE WERE QUICK to discover that Congress and the Washington establishment understood very little of what was happening in the regulated telecommunications world.

I'll never forget, there was a routine hearing on telecommunications by a congressional committee. One of the congressmen, near the end of the meeting, asked the FCC chairman, "There's something that bothers me a little bit ... and I wanted to ask you about it. Sometimes I hear the word 'AT&T' and sometimes the phrase 'Bell System.' ... What are those two things?"

I said to myself, "This is the chairman of the commerce committee!" Of course, I was also busy reading everything I could get my hands on.

McGowan and MCI believed that someone other than AT&T could build a national network and provide long-distance services — a concept that was nothing short of radical in the 1960s.

I spent seven years on the railroad during high school and college. My jobs had to do with clerical, administrative and telephone communications. Central Railroad of New Jersey had its own communications network, you see. To me, having your own network was not a great deal.

So, years later, when people just assumed you wouldn't, or shouldn't do it. ... I felt they'd just been brainwashed.

I have to believe [competition] would have happened anyway [even without an MCI or Bill McGowan], but I don't know how long it would have taken. The question is: Could AT&T have done more to preclude us from entering the market? The way they tried to preclude it was by saying, "No." If the Bell System had done its cost accounting in a better way — that didn't leave such an enormous spread between cost and charges — we couldn't have moved in. That gave us the margins to build our own system and operate it.

AT&T didn't know what to do ... and that gave us four or five years of breathing room. They waited a long, long time [to respond to the competition].

The FCC didn't know and never thought about where things would end up. They did very little planning or guessing as to where things were going or where they probably should go. The Hill was less involved. The Hill doesn't do anything; it only reacts to what you do with it.

[By now] I'd hoped [AT&T's] market share would have dropped more. What has interfered with that is that there has been a significant decrease in the growth of the industry because of the recession over the past few years.

"One of the things that is starting to happen, as information is readily available anywhere in the world, is that the local mind-set is going away."

Looking at the network of the future, McGowan foresaw fewer distinctions among different communications media and more regulatory lag.

It seems clearer every day that the once highly distinct structure in the industry is broken down. For example, local telecommunications service and long-distance [service] look like they will blur. It also seems that the information business and entertainment are going to start blurring with interconnections at the home.

But the deregulation [of local carriers] is going to happen later.

For the last four or five years, and for the next four or five years, the technology has gotten ahead of policy. You can do things today that people don't know how to cope with, from a policy standpoint.

When you take a look at it now, there's not been really a need for much more than what has been put in place. We're now all digital, and I'm sure AT&T can piece together an all digital network, too.

[In the future,] bandwidth is going to be higher, fiber is going to be more ubiquitous.

Also, you now have a cadre of people — the CIO — who number probably in the thousands who are very professional managers of information technology. So organizations are getting more and more sophisticated.

[Wireless communications technology] is certainly a legitimate business [too]. But God was not a very good scientist, and he didn't give us very many radio frequencies, relatively speaking. We're still dependent on a closed wire environment.

McGowan was known inside and outside of MCI as a big fan of E-mail and fax for communications.

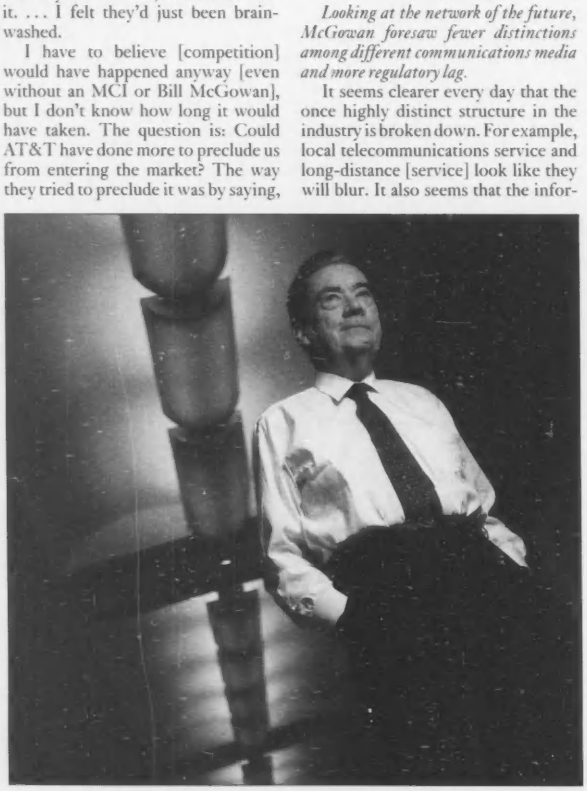
Before we had MCI Mail, we'd have, every Monday morning, a meeting to share information. We went right around the table and everybody would say what they were doing and why they were doing it.

But when we decentralized the first time, in August 1984, I realized we couldn't do that. So we put in an MCI Mail system, and as soon as we put it in place, I realized 90% of what was said on Monday was known on Friday. So I had them enter [that] into the mail system by Friday afternoon.

Even today, in this company of 25,000 employees, senior executives pretty well know everything that's taken place in every division. [The E-mail report] is around 40 pages long.

One of the things that is starting to happen, as information is readily available anywhere in the world, is that the local mind-set is going away. [In addition,] you won't have things being done based on incorrect information. And that will have a significant effect on the way people work and live.

Interview by Ellis Booker, CW's Midwest bureau chief.



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Scott McNealy

Scott McNealy strides across the stage at the front of a cavernous ballroom in the San Francisco Marriott and turns to face an audience of 1,500 at the Uniforum Unix trade show earlier this year. Beaming that trademark toothy grin, the 37-year-old CEO of Sun Microsystems, Inc. banters with the crowd about "a new year and a new Scott" — one that is "noncontroversial" and "nonbiased." Everyone laughs at the obvious fib.

For the next 40 minutes, the engaging president of this $3.2 billion workstation powerhouse barrels through his talk on "The 10 Myths about Unix" (actually, he runs out at No. 9). He is alternately witty, scathing, charming and evangelical.

What no one can tell — except perhaps his mother, who was sitting in the front row that day — is how incredibly nervous this Midwesterner-turned-Californian feels in front of a crowd.

WHEN I TOOK over as president of Sun in 1984, I hadn't really done any public speaking at all. Two days later, we had our first Sun user group meeting and I got up in front of this big room to give a speech. I was petrified.

These people had been sitting there for three hours, watching other people talk, and I knew they had to be burned out. When I told them I had about 35 slides to talk them through, you could hear this audible groan. So I said, "Before I get into my slide show, thanks for your support and for buying our computers. . . ."

Then I just went through the first four slides: clickclickclickclick! And the next batch, even faster. They loved it. They gave me a standing ovation.

I accidentally learned a big, big lesson that day — that putting yourself in your audience's shoes is so important. They are coming here to listen to me, so I'm going to entertain them and tell jokes and be controversial.

"He's very good at building and attracting strong teams," says John Doerr, a member of Sun's board of directors and one of McNealy's longtime friends and mentors. "He won't surround himself with 'yes' men or women, so the discussions at Sun are loud with lots of noisy, strong opinions expressed."

Doerr, a venture capitalist, always watches for the key qualities in a great CEO: intelligence, integrity, high energy levels, an ability to sell and a gift for managing people. "I find all five of those in Scott and in [Microsoft Corp. CEO] Bill Gates," Doerr says.

Bill Gates and I are probably much more alike than Steve Jobs is like either of us. Steve is a unique individual, probably more of a product visionary than either of us are. I consider Gates to be a very dangerous competitor. There's nothing nicer I can say about someone than that.

When it comes to Sun's toughest competitors, I don't think DEC or HP can put us out of business. IBM can — not because of management style, but financial muscle. But Microsoft can do it because of market muscle, and Gates is ruthless. He understands it's war, and he has no compassion for the other company — as well he shouldn't. That's what he gets paid to go do, just like I get paid to make my shareholders successful.

People think I'm a risk taker, but that is the farthest thing from the truth. When we started Sun, I knew there was no way — if we were to adopt Microsoft's operating system — that we could survive long-term.

Adopting Unix was our only chance. Going in with our own microprocessor was the only chance we were going to get out from under the chip monopolies. If it flamed out, we could always fall back on the monopolists. But if we did win, we had huge things to gain.

Among the most significant events in Sun's 10-year history, McNealy counts his recruitment of Bill Joy, his chief technology officer; the 1985 win against the former Apollo Computer Co. for a contract with Computervision, Inc.; and the $20 million investment in Sun by Eastman Kodak Co., which insisted McNealy stay on as CEO.

When asked about the long-term survival prospects for Sun — vis-a-vis competitors from Japan or the U.S. — McNealy has a favorite story about a bear.

I liken it to being on a hike with a group out in the woods, and all of a sudden a 40-foot grizzly bear starts chasing everybody down the trail. Sun Microsystems doesn't need to worry about what everybody else is doing. Instead, it needs to stop and get its running shoes out of its hiking bag.

And if anybody says, "Why are you putting your running shoes on? You can outrun the bear in hiking shoes," the answer is: We don't need to outrun the bear. We need to outrun everybody else.

I've always thought it was healthy to have a very strong understanding of who the enemy is. I played a lot of team sports and a lot of individual sports, and I want to beat my competitor. When I'm on the golf course and my competitor is lining up a 4-foot putt, I'm thinking with every brain wave: Miss!

Everything I say may be exaggerated a little bit, or taken to the extreme, but I do that for clarity. And I say it in a way that everybody doesn't take me literally. In business, this is war. Diplomacy and political correctness don't have their place.

I cringe every time I'm sitting on an airplane and looking through *Businessweek* and there's my picture. I think, Oh God, what did I say now?

Looking at the broader picture of the computer industry, McNealy sees it on an unstoppable path toward more consolidation.

There's still three to five times too many employees in the industry. There's still way too many computer companies in the computer business, so you're going to see mergers, Chapter 11s, bankruptcies. Long term, Sun will still be a global player. I see very little change in our focus, in terms of trying to be the world's best client/server computing supplier. We've been very consistent with our message and our strategy over the last 10 years.

Ten years from now, you'll have maybe one computer company in Europe. You'll have Microsoft, IBM, Sun and maybe a couple of others here in the U.S. I think we'll be one of the top three computer companies in the U.S. by the year 2000. Everybody else, I think, is a big question mark.

"Scott McNealy may be arrogant, but he knows how to do business," says Rikki Kirzner, a Unix analyst at Dataquest in San Jose, Calif. "He is incredibly focused on what his clients need and what the corporation has to do to gain market share."

Another analyst who has watched McNealy over the years is Wes Melling at Gartner Group in Stamford, Conn. "If you were judging just on the pure fun of listening to him in a meeting, he's one of the greatest businessmen in the world," Melling says. "He

"I cringe every time I'm sitting on an airplane and looking through *Businessweek* and there's my picture. I think, Oh God, what did I say now?"

has a wonderfully quick mind. He's able to bring a message of unbelievable braggadocio to a meeting and make it come across like a reasonable conversation."

My role is to position Sun's product strategy, mission and vision in the best light possible. If the other company isn't doing a good job of presenting its vision, I'll present it for them.

I try to put our strategy into Joe Sixpack terms. I hear all the talk about new technologies and new environments, but what I tell my people is that there's only four places to sell computers: to the office, the home, the briefcase and the shared resource or common space, like the MIS department.

Nobody explained to me those were the four spaces to sell computers. But I wanted to put it into terms of the distribution channels for the products we market.

The trappings of wealth and power do not seem to impress McNealy much. Out of a sense of patriotism, he buys only American cars. He hates wearing suits. He prefers cheeseburgers, pizza and beer to haute cuisine. Forget about the fine arts.

His dream vacation is nonstop golfing in sunny spots such as Palm Springs or Hawaii, and he plays hockey year-round with a zeal that often leaves him sporting black-and-blue marks. That high-octane streak of competitiveness shapes McNealy's entire approach to life, his friends and business colleagues say, and his greatest passion is clearly his company.

Curt Wozniak, vice president of engineering at Sun, has been a friend of McNealy's since the two met at Stanford 14 years ago. "One night, after we'd had a few beers, I asked him what his real goal was for being at Sun," Wozniak recalls. "He said there were two real purposes: One was to win, and the other was to have fun."

I'm really pretty basic; just normal. I'm not very good at self-analysis. I just get up and go do it, until I get tired and pass out. Then I get up the next morning and go do it again.

I would love it if it all works out that I could someday have a family and kids and still do this job. I just don't know if that's possible.

I think if I've done anything for Sun, I've added courage. When a lot of my managers want to back off and do the suboptimal answer, I start saying we've got to go do this, it's the only right answer.

Even if Sun goes belly up, we have had a positive impact on the industry. We have forced it to open up, to innovate faster, to go client/server and to take Unix seriously.

We are the most focused $3 billion dollar computer company I know of. We've got 12,500 people, and millions of dollars are spent every year to get them all aimed in that one direction: my slogan about "All the wood behind one arrowhead." That kind of focus is an unstoppable force in the computer business.

Interview by Maryfran Johnson, CW's senior editor, workstations.

Photography by Alan Levenson

RECLUSIVE GENIUS

Seymour Cray

The supercomputer has made possible radical advances in engineering, solids modeling and complex simulations, and Seymour Cray is widely acknowledged to the be the creator of supercomputing. He is currently the chairman of Minneapolis-based Cray Computer, a spin-off of Cray Research, which he also founded. The company is attempting to market a next-generation supercomputer based on gallium arsenide technology.

But for all his celebrity, Cray is notoriously reclusive. For years, he has refused all public appearances and requests for interviews, including several for this issue. But on Nov. 15, 1988, he made a huge exception. Before several thousand people at a supercomputer conference in Orlando, Fla., he gave a keynote address on gallium arsenide chips and received a standing ovation from the crowd, most of whom had never seen the brilliant inventor of the computers they used.

What follows is an edited version of his speech and some comments from an after-speech press conference.

FOR ME, THE history of supercomputing began at the University of Minnesota in the spring of 1951. I needed a job. I'd run out of money. One of my instructors said, "Try the old glider factory in St. Paul." I thought that was kind of strange, but since I didn't have any place else to look, I decided to give it a try.

I didn't realize that there were two groups in the U.S. attempting to build general-purpose computers. One of them was on the East Coast with [J. Presper Eckert and John Mauchly]. It was called Univac — Universal Automatic Computer.

The other group [Engineering Research Associates] was in St. Paul working in the glider factory. This was John Parker and Bill Norris. Bill was trying to make a living on cost-plus-fixed-fee work for the Navy. He seemed to be doing all right, so I took a job.

I worked for about a week not knowing what I was doing, and then it occurred to me — none of these people knew what they were doing either. I realized in talking to the other people that the blind were leading the blind, and I was as good as anyone.

The Navy assigned the work there by tasks, and the task I was assigned was Task 13, which was to build pulse transformers for a general-purpose computer. I felt uniquely capable of doing this job because I had two powerful tools. First, I had just taken a mathematics course in Laplace transforms. The other tool I had was a circular slide rule, the 10-inch model. That's as big as circular slide rules were made, so I had the very top of the line.

If you had a circular slide rule, you had some social problems in college. Almost everyone else had a straight-stick slide rule, and they came in a nice leather case with loops on the back so you could hang them on your belt. Those of us with circular slide rules couldn't do that, so people looked at you kind of funny and thought, "Do you suppose he's really not an engineer?"

But here came the payoff, I thought, because I had this powerful computing tool. I made reams and reams of calculations for my pulse transformers. I built a prototype and it worked, and Task 13 went into production, and I felt quite smug.

Then one day I took a walk down to the glider factory, and at the other end of the line I found a much older engineer. I asked him what he was doing, and lo and behold, he was making pulse transformers, too. I told him about how I had made pulse transformers using Laplace transforms and my big 10-inch circular slide rule. He smiled and said, "I know about Laplace transforms, and I know about circular slide rules, but I don't use either one of those. I use intuition."

I thought, "Wow, here's something new." So I put away my circular slide rule, and after that I used intuition. That was my very first lesson.

A year later I was on another project, and we had to have another name. We couldn't use Task 13 because that belonged to the Navy, so we converted it into binary and called it the 1101. That's how the [Univac] 1100 series got started.

"Thank heaven for start-up companies or we'd never make any progress. People who get unhappy with structure in companies can move on and start their own, take the big risks and occasionally find the pot of gold."

As we went along to 1103 there were giant steps forward. For the 1103, we had a new technology — magnetic core memory — and we had a huge memory — 4,096 words. That was the beginning of serious computing.

So I began a marketing effort, and that caught the attention of a typewriter company called Remington Rand. They bought both Eckert-Mauchly and Engineering Research Associates. Pretty soon we had all the business we could handle. I went through a number of other projects there, but the company was getting too big for me. I decided it was time to move on. So did Bill Norris, so we started a new company called Control Data Corp.

We got a little corner office in a warehouse in downtown Minneapolis that belonged to the *Minneapolis Star & Tribune*. The warehouse was filled with newsprint, which came in monster rolls that weighed about two tons. They were piled on one side, and I had this little lab on the other side.

I worked mostly at night, and there was this noise because there were little wooden blocks under these big rolls, and they'd keep slipping. I knew if any one of them let go, there'd be a big roar and they'd all roll across the room and smash me into the wall.

I was the one who decided we should make computers. Everybody else thought we should go into point-of-sale machines for department stores, but I said, "No, all I know is how to make computers, so I'll do that." But I knew it had to be very, very cheap because we didn't have much money.

I went to the local store that was sort of a Radio Shack at that time and said, "What's your cheapest transistor?" They found me one that cost 37 cents each. I said, "Great, I'll take all you have." I went back and tried to make a circuit out of those things. No two were alike, but never mind — I had to do it.

We continued to make machines, memories got bigger, the company got bigger. It got too big, so I had to leave to start again. I like to start over. I keep doing it.

I started Cray Research, and I concluded transistors just weren't going to get faster fast enough. But we were missing the serial speedup we would like to have, so I began to think about gallium arsenide in about 1979 or 1980.

I talked to Rockwell [International Corp. in 1983] about gallium arsenide circuits, and they gave me a big book of rules. One thing about people who develop circuits without knowing about computers is that they make rules that make it very hard to make computers.

But then I talked to the people at GigaBit Logic and they immediately said, "Geez, we don't have any rules. We're just starting our company, so I guess you will have to help us make some."

And I smiled. There was a blank piece of paper, and I really love blank paper. In a period of about nine months, we put together very workable gallium arsenide circuits.

Thank heaven for start-up companies or we'd never make any progress. People who get unhappy with structure in companies can move on and start their own, take the big risks and occasionally find the pot of gold. I think that's just wonderful.

Research by Gary H. Anthes, CW's Washington, D.C., senior correspondent.

Photography by Steve Woit

Harold Greene

It was the summer of 1978 when Harold H. Greene inherited one of the biggest antitrust cases of all time, U.S. *v.* AT&T, just a few days after being sworn in as a federal judge.

Some antitrust experts thought the AT&T case was too big for a single court to handle, but Greene was determined to prove that the U.S. judiciary was up to the job. He brought to the case a passionate belief in the importance of the judiciary to the American democratic system.

Of Jewish parentage, Greene escaped with his family from his native Germany during the rise of the Third Reich.

Once in the U.S., Greene graduated at the top of his law school class and worked at the U.S. Department of Justice, where he drafted the Civil Rights Act of 1964 and the Voting Rights Act of 1965.

In January 1982, the Justice Department and AT&T announced a settlement of the antitrust suit. In a stunning display of judicial activism, Greene said he would have to review the settlement to ensure it met the "public interest" — a role he has played ever since.

What follows are edited excerpts from two speeches Greene delivered in 1988, in which he defended the Bell System breakup and his continuing administration of the settlement decree.

SHORTLY AFTER THE breakup, I received letters from a number of ladies, identifying themselves as widows living on their AT&T stock, who complained that because of divestiture their capital was likely to be decimated. The letters were impassioned, and they were bitter; some of the writers used words that I thought elderly ladies did not even know.

What has actually happened? By 1987, the value of the stock held by my widow correspondents had almost doubled.

How about the rest of us? The decree has worked just as antitrust doctrine would have expected it to work. In long-distance service, where there now is competition, rates have been lowered by over 35% since divestiture. The only discordant note is struck by [higher] local telephone rates, which are set by the only remaining monopolies.

In the days of the dominance of the Bell System, the consumer was not permitted to buy telephones at all; he could only rent. The monthly rental charges amounted to about $28 on an annual basis, to be paid by the customer month after month, year after year until he was transported to that telephone booth in the sky where, presumably, Ma Bell did not have the pervasive power she had on Earth.

Today ... telephones can be purchased for as little as $13 each — the price of less than six months' worth of rental fees in the old days.

But price is probably the least of it. In my opinion, the most significant consequence of divestiture has been its effect on the pace of innovation. Consider the cornucopia of telephone-related products that have made their appearance since the AT&T monopoly was broken up on Jan. 1, 1984.

[On a broader scale,] optic fibers now carry an enormous volume of telecommunications with the speed of light. Although the technology was available before divestiture, it took AT&T's competitors, who invested heavily in fiber optics in an attempt to expand their toehold in the market, to upgrade this country to fiber-optic transmission.

In the 1980s, Greene steadfastly refused to eliminate the business restrictions that the decree imposed on the regional Bell holding companies, despite heavy-duty lobbying campaigns by the Baby Bells and the Reagan and Bush administrations.

Having pursued the [AT&T antitrust] lawsuit with determination for seven years, and having drafted, defended — yes, insisted on — the decree before it took effect in January 1984, the Department of Justice began a flip-flop only 18 months later. Beginning in July 1985, albeit under different leadership, the department started to argue just as vehemently for the removal of those restrictions as it had earlier insisted on their inclusion in the decree.

"Although the technology was available before divestiture, it took AT&T's competitors, who invested heavily in fiber optics in an attempt to expand their toehold in the market, to upgrade this country to fiber-optic transmission."

The regional [Bell] company spokesmen usually claim that their entry into the various forbidden markets would increase competition because it would increase the number of competitors. [That's true only if it is] assumed that the addition of a wolf to a flock of sheep would maximize competition in the flock.

It is also said that the regional companies are only asking for a level playing field, for an opportunity to compete on equal terms with others in long-distance, manufacturing and information services.

But these companies continue to have a tight hold on the essential facilities represented by local telephone switches and circuits, which all of their potential competitors must utilize if they wish to reach the consuming public. They want both: monopoly and competition.

It would be the inevitable effect of such a combination to establish a field that was neither level nor fair. The ensuing competitive struggle would be no more even than one between the Washington Redskins and the Denver Broncos, if the latter ... had an absolute franchise on the two end zones, which the Redskins could not touch or cross except with the Broncos' permission.

In 1990, however, Greene experienced his first big setback in the case when an appeals court practically forced him to allow the Baby Bells to fully enter the information services market. In his follow-up opinion written last July, Greene's disgruntlement was readily apparent.

The contention that it will take the regional [Bell] companies to provide better information services to the American public can only be described as preposterous. The regional companies have no experience in the content or substance of information, whether it be news, financial information ... or the provision of interactive services.

Far more probable ... is the possibility that once they are allowed in the information services market, many of those who now provide such services will be driven out of business by the anticompetitive strategies which, on the basis of past experience, the regional companies will likely adopt.

In the opinion of this court, informed by over 12 years of experience with evidence in the telecommunications field, the most probable consequences ... will be the elimination of competition from that market and the concentration of the sources of information ... in just a few dominant, collaborative conglomerates, with the captive local telephone monopolies as their base.

However, ... the court is not free to make its own judgment. Indeed, it has concluded that several rulings of the Court of Appeals in its 1990 opinion leave it no choice but to remove the restriction.

It will accordingly do so, albeit with considerable reluctance.

Research by Mitch Betts, CW's national correspondent.

Photography by Katherine Lambert

CHIP CAPTAIN

Andrew Grove

With $20 in his pocket and only a rough sense of the English language, 20-year-old Andras Grof came to the U.S. from his native Hungary in 1957, soon after the Soviet Union crushed the Hungarian uprising. He Americanized his name and is better known today as Andrew S. Grove, president and chief executive officer of Intel Corp. — a job he's held since 1987.

Just three years after he arrived in the U.S., the onetime student of opera (his favorite character remains Don Giovanni) had earned a degree in chemical engineering and then, in 1963, got his Ph.D. from the University of California at Berkeley.

In 1967, Grove wrote a best-selling textbook on semiconductors and the next year teamed with Gordon Moore and Robert Noyce to found Intel, serving first as director of engineering.

Grove has become something of a management guru, writing a regular newspaper column on management and two books, *High Output Management* and *One-on-One with Andy Grove*.

He is reputed to be serious and severe, but some say he's mellowed and displays a charming wit. Some trace this mellowing to his 1987 announcement that he'd retire by 1992 — which he later rescinded.

WORK WAS TOO much fun [to retire]. Navigating Intel in this turbulent industry is too interesting. When I first put that date in the public domain because I wanted to force myself to stick with it, it was early '87, and I couldn't see how interesting all of this was going to turn out to be. I thought my work from there on forward would be similar to my work up to that point. Having done that for 20 years, I figured another five years would be enough.

In reality, because of the [rapid] evolution of the industry and the growing role Intel has played in this industry, it has become all too interesting and very different than what I've done before. That is why I changed my mind on that one.

I'd like to see Intel as a big technology-creation machine for this industry, which I think is probably the most important industry in the world. It's kind of like electric motors were important when they were big and clunky and special-purpose, but they later became truly important when they became mass-produced and got into everything from electric shavers to toothbrushes.

In similar fashion, the computer industry is reaching its true importance; computers have become a mass-produced, mass-merchandised item.

I think the computer industry is a kind of laboratory for the [general business climate] of the '90s. You can see the patterns of the computer industry in completely unrelated fields — very standards-oriented, very deregulated, very time-oriented. The competitive differentiator is who gets there first.

There is also the leveling of technological capabilities of the different regions in the world. Boundaries are getting leveled, and in international business, international market share is the only thing that matters. Increasingly, the only differentiation in business is timeliness. Computers give you time.

[Intel] played an enormous role in this: Whether we knew it or not, we were supplying the basic building blocks that created the first leveling, and if it wasn't us, it would've been somebody else. This trend would've happened with or without Intel, but it would've happened with somebody's standard building block.

Once that first layer is leveled, the possibility of mass-produced software and mass-produced applications comes. When that happens, price gets so low that mass methods of distribution come in to play, as compared to the direct, consultative selling that the computer industry has used all through the decades. So there is kind of a technological inevitability to all of this, [although] we did not realize it at the time.

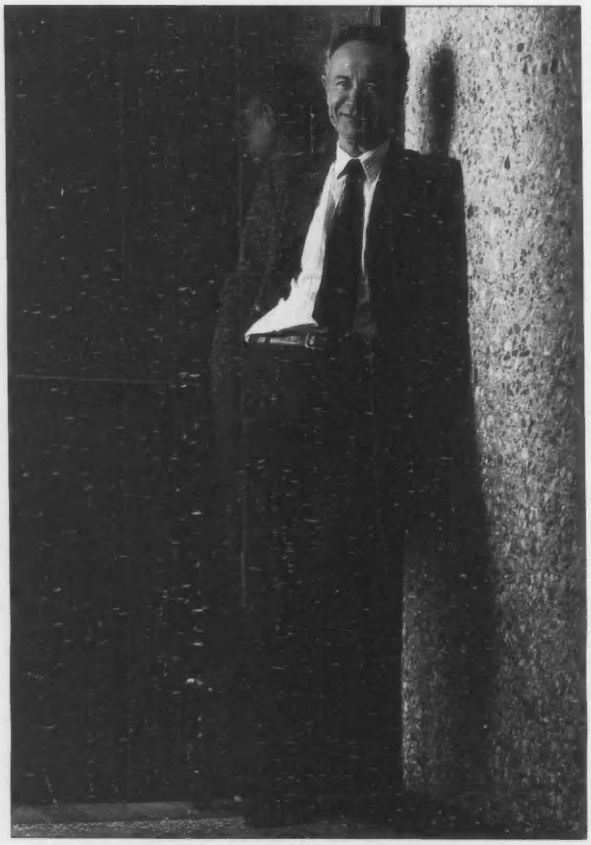
We were obviously heavily involved in the first PC [from IBM, which used Intel's 8088 chip], but I didn't understand the significance of PCs in the beginning. IBM also chose the 8088 as the engine for the DisplayWriter, and I thought the DisplayWriter was just as significant. It disappeared two years later, and the PC became a big deal. But we couldn't tell that.

Starting Intel was very hard, and the first year was very, very hard. Everything was new, and you feel you have to do something significant, but you don't have the tools; you don't have anything.

In addition to the technical difficulty, you have people who don't know each other, so there's a lot of infighting. You're trying to put all this together, and I was a very inexperienced manager. It was very hard.

So don't expect instant gratification. There have been periods in this industry in the last 10 years where people entering have had a very easy time. That's typically not the case, and it's very unlikely to be the case [in the future].

Work ought to be fun. You shouldn't sacrifice that element for a bunch of other things because at the end of the day, you'll be very sorry.



Grove the management guru does not have an MBA, perhaps because he believes there is no higher calling than being an engineer. That's why he's distressed that America, the adopted country he cares about so fiercely, is losing its competitive edge in engineering and manufacturing to foreign competitors.

This comes from a belief that you can only fool Mother Nature for so long, and through the decade of the '80s, this country tried to fool Mother Nature in trying to create wealth by rearrangement.

Ultimately, after you rearrange everything several times, your furniture remains the same. If you want better furniture, you have to add value, and we have not built the emphasis in this country on that.

In the '60s — during the Sputnik era — people like me were drawn into engineering because it was so prestigious. Then comes the late '70s and '80s and all of this rearrangement. It's going to take us 15 years to regain our momentum. We have not drawn the best brains into engineering and manufacturing in the numbers that we should have.

Interview by Michael Fitzgerald, CW's senior writer.

Photography by Alan Levenson

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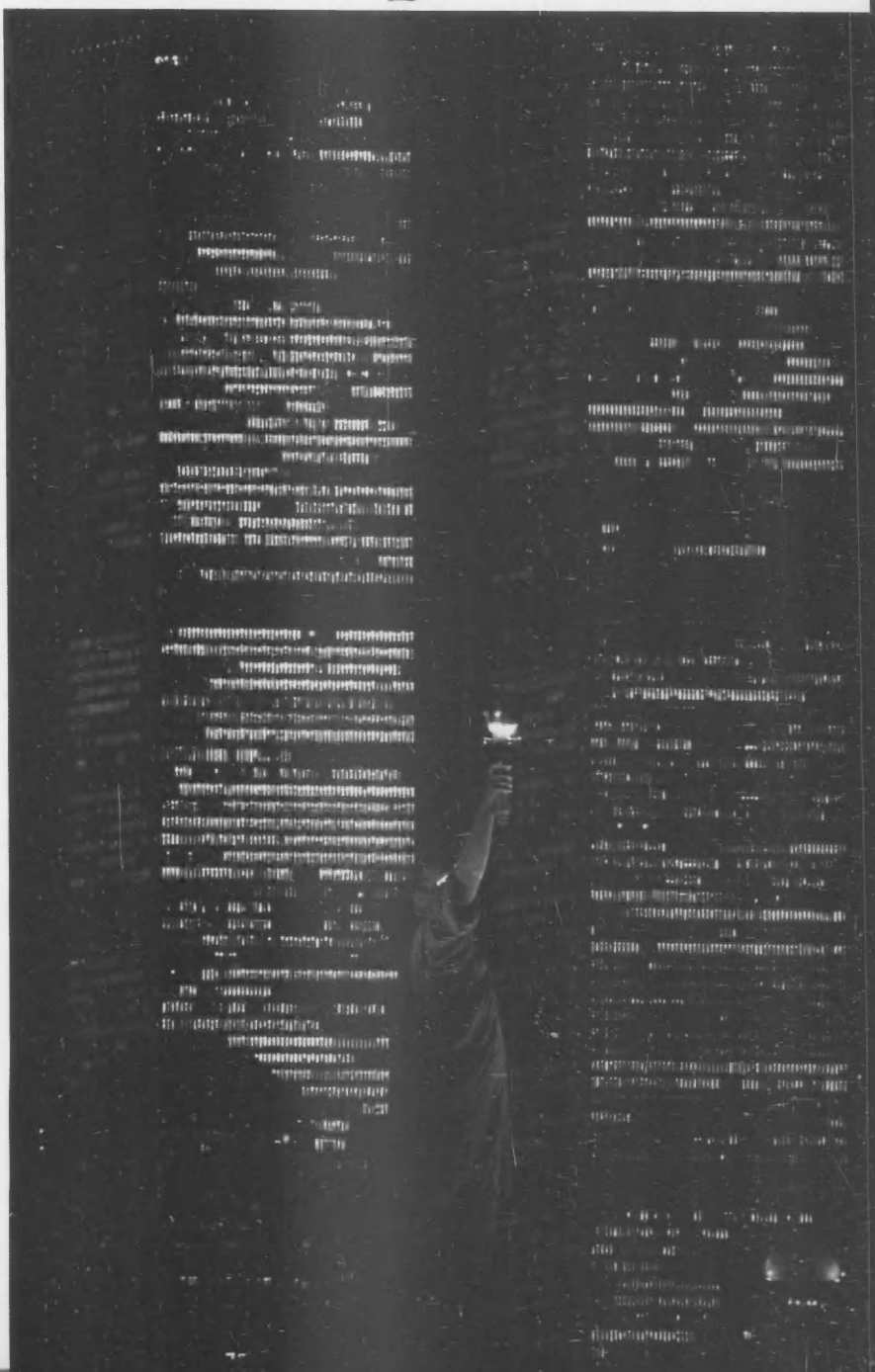


Douglas Engelbart

He may be the most important anonymous man in computing. He is credited with conceiving, among other things, desktop word processing, screens with windows and groupware. He also holds a patent on the mouse. But Douglas C. Engelbart's is an obscure name largely because the man developed many of his ideas in the mainframe era of the 1950s and '60s, long before desktop computing was even possible.

Despite some recent and overdue recognition, such as winning the 1991 Coors American Ingenuity Award, the 67-year-old Engelbart still struggles to gain acceptance for his ideas, and he may run out of money for his latest venture, The Bootstrap Institute.

Engelbart, who holds a Ph.D. in electrical engineering from the University of California at Berkeley, directed the Augmentation Research Center at the Stanford Research Institute and was chief scientist at Tymshare, Inc. But what has become a personal odyssey of frustration began when he started his first job, at NASA's Ames Laboratory. It was then that he proposed to the woman he married, Ballard Fish, an event that made him decide to strive for some larger goals in his life.

GROWING UP AS a Depression kid, your goals were kind of simple: Get a steady job, get married and live happily ever after. [When I got engaged,] I had a steady job, I was an engineer but had no more goals than that. It was sort of embarrassing to think I could be 25 with no bigger goals than that. So what I did was overreact and create a goal that was way too big.

The goal wasn't to do pretty things with computers. The goal was to get human organizations to be a lot more capable of dealing with complexity. In 1951, the complexity and urgency of human problems had already surpassed our ability to cope. I knew that if we couldn't improve it, we were in real trouble. The computer augmentation that came to mind was just not in line with the computer technology at the time at all.

[Today,] there is no question that there is going to be all the computer power we need. So, let's start getting oriented about how you would harness it and make changes because this side is going to take a lot longer to change.

Engelbart says, without apparent bitterness, that his concepts netted him virtually no money. When he spoke at industry conferences in the late 1950s, the 1960s and even the 1970s, his notions of personal computing to enhance productivity were ridiculed or ignored.

There's a sort of maxim I made: The rate at which a person can mature is directly proportional to the embarrassment he can tolerate.

I've tolerated lots.

The two or three most specific times where I realized I'd lost the audience were in the '60s. [One time] I said I think organizations can be a factor of 10 more [productive] than they are today, and that did it — that was like you'd admitted being a communist or something. Another time, I said computer responsiveness would [become almost instantaneous]. This one fellow, a founder of our computer science department and a good friend of mine, said he would not understand how to use a response time of less than 20 minutes.

I've been fired, I've been called a loser and just all kinds of things, so now I'm getting acclimated to that. But the road along there ... [he shakes his head and laughs] it was cold and lonesome. There's a lot of times you wonder that, God, maybe I'm just really wrong, maybe I've got some real aberration in my subconscious and I'm really way off.

One perennial thing that keeps happening is [that people say], "Well, yes, you did those things back then, but now we're in the modern age of technology. OK, Ben Franklin, you're lucky you didn't get electrocuted." The perennial problem seems to be that the way I talk about [the direction computing should go] has always been different from the prevailing paradigm. So there's always been this sort of stress between me and the current way.

[In the early '70s], people started talking about office automation, and people said, "We're going to automate our old methods and procedures." I said, "No, [technology] is going to revolutionize [organizations], and a lot of those methods should be changed because those aren't the important things." What you're trying to do fundamentally is make people in the organization more capable.

"The problem is not the technology, but to change our perspective on what it's for. Who would believe [in the 1850s] that you could have an empty intersection and because the light's red you stop?"

You have to start looking at exploring the kind of changes that now can become practical. That was the whole augmentation thing, and I thought everybody would see the sense of that.

Instead, the dominant voices in the office automation field just ridiculed [me]. For people to still be talking about automating is missing the point, and they have been missing it for 15 years.

The issue of paradigms — how people perceive the world, as it is or as they think it will become — is the biggest issue in this whole frontier of organizational improvement.

There are plenty of examples of shifts in paradigms that came much later than they necessarily could have, which cost a lot. How come the first big wave of PCs — Apple and IBM — had zero provisions for interconnecting or networking, when for close to 15 years there'd been very active networking going on on Internet? It was seven or eight years before PCs turned in that direction. Consider what a lost opportunity that was.

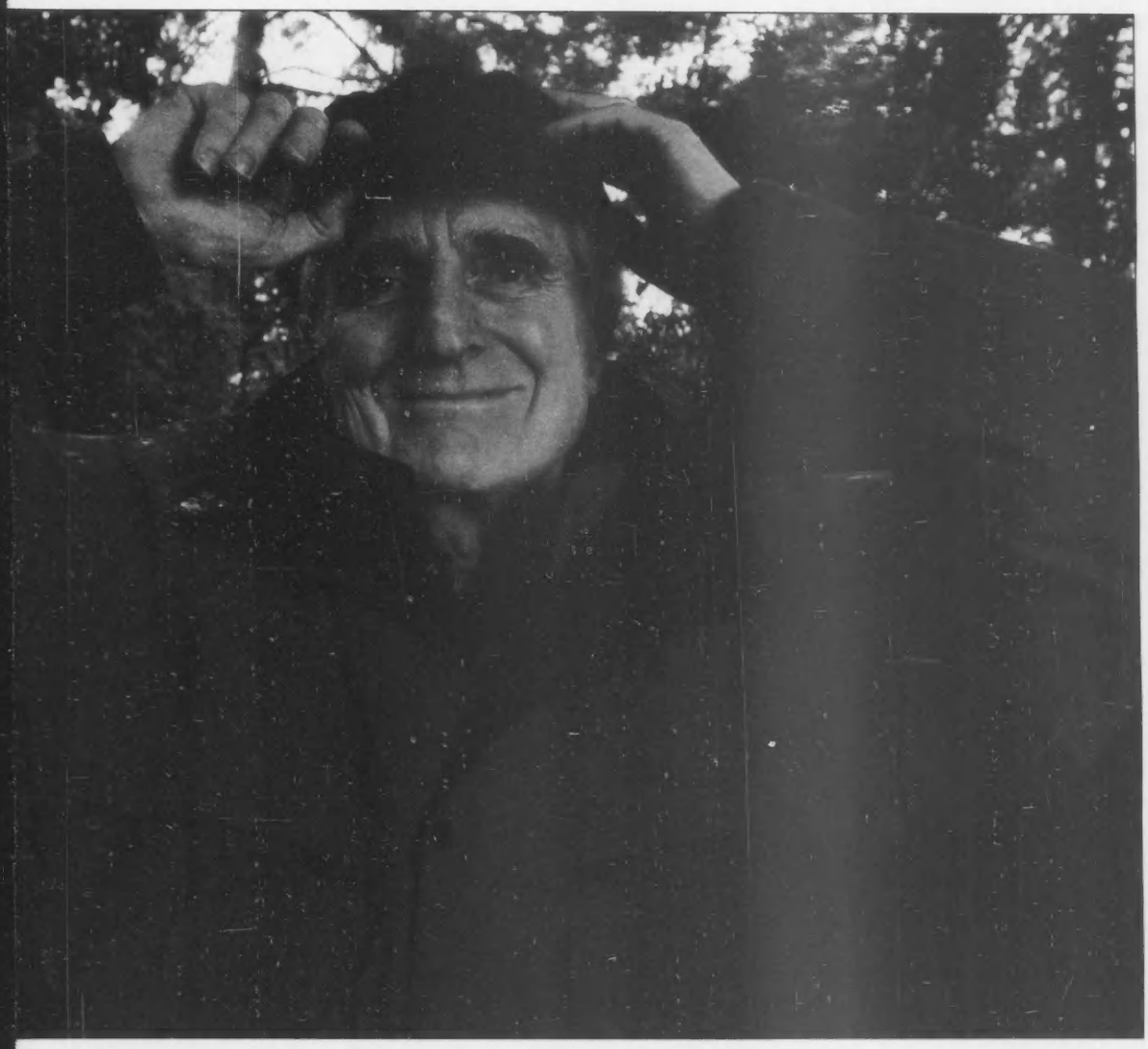
People tried to say the technology wasn't ready. But they already had Ethernet, packet switching, etc. It needed more development, but you had to have the people with the right assumptions driving the market with PCs and software. Back then, it was all for the individual.

The dynamics of the marketplace are that vendors make products their product development people think are the neat next things, and they run around and say, "We're going to make something a little bit better."

The problem is not the technology, but to change our perspective on what it's for. If you design today's automobile traffic, insurance, training, etc. on the basis of the perspective of the 1850s person, what would you have? You might end up with an automotive engine, but what kind of speed, what kind of traffic control? I mean, who would believe that you could have an empty intersection and because the light's red you stop and you wait until it turns green?

So [the need for] paradigm shifts is what I've come to realize — and

"The rate at which a person can mature is directly proportional to the embarrassment he can tolerate. I've tolerated lots."



not take personally that people didn't agree with where I thought things were going. [We're] going to have to find very practical ways to change the world, to accelerate the evolution of paradigms. We can shift people's paradigms, but that shifting has to be part of their paradigm.

Engelbart has always believed that computer technology should augment the knowledge worker's capabilities — by becoming a sort of worker's performance "coach," for example. That, in turn, allows the worker's organization to dramatically improve itself, which is the philosophy at the heart of Engelbart's Bootstrap Institute.

This whole bootstrap strategy is to invest in your improvement so that the results not only improve your operations but improve your improvement process.

An organization's capability to do its work isn't just one big glob of capability, it's a series of capabilities that are integrated. Organizations do evolve, but how explicitly is that budgeted, recognized and prepared for? It's done organically with no recognition it's happening in a big organization, so one thing you have to look for is the capability to evolve. That's what I was looking at 30 years ago. People tend to have a feeling that you offer them a technology, and then see what they do with it. And I say well, I'll give you golf clubs and see what you do with them, see what your score is.

[One of] my ideas is to start building in coaching as a matter of course. You accept [the concept of coaches] in sports without a question, but you don't accept it in [business]. So what do you mean by a high-performance organization? If the rate of change of business keeps going up and up, how are individuals going to keep being even relatively high performers in their profession, relative to their peak capability? Those are the kind of things I'm really trying to get a dialogue going on.

The emphasis on easy-to-learn and natural can be very dangerous. [It's like] saying, "Here are two systems: One of them you can learn to use very quickly, but the other one is very difficult and unnatural." Then I show a picture of a tricycle and a bicycle and say, "How come we ever got past the tricycle stage?"

[Technology can produce] large-scale quantitative changes; the whole organization can take on a very different form. Why muck around with all the short-term stuff? If we could talk about the long-term and start getting aligned with it, we would save a lot of zigzag wastage.

I'm just as frustrated [now as then]. The things that we produced in the '60s and '70s and couldn't get people to listen to, I feel exactly the same way now about this [bootstrapping] stuff. Why aren't they listening? It's a rhetorical question because I know more about why [the industry isn't listening], but . . . I actually get pretty depressed.

Interview by Michael Fitzgerald, CW's senior writer.

Photography by Alan Levenson

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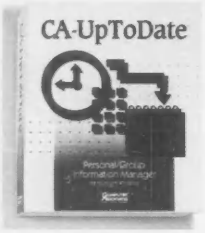

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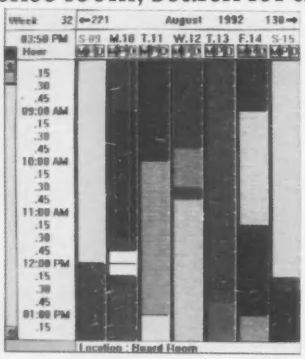

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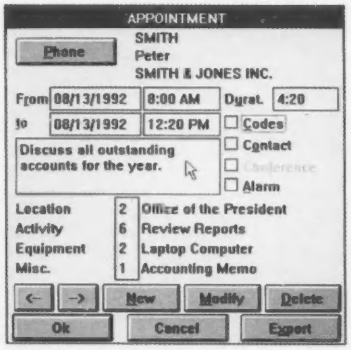

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TRUE BLUE

Tom Watson

At 78, Thomas John Watson Jr. still has a mission in life: "To have as much fun as I can."

He still sails with his wife and 15 grandchildren in Maine and the Bahamas, and he says he wants to go on "one more big one" — perhaps to the Azores.

But it's not all fun and games for the former IBM chairman. He also studies Soviet-American relations at Brown University's Institute for International Studies, which was named in his honor because of his financial gifts to Brown and his 1979-1981 stint as ambassador to the Soviet Union. "I have just enough to keep me feeling useful," Watson says. His 1990 book, *Father, Son & Co.*, sold 190,000 copies.

Watson is widely credited with being the man who led IBM into the computer era. Under his stewardship, IBM's revenue grew more than tenfold, from $650 million in 1956 when he took over as president, to $7.5 billion in 1971 when he stepped down as chairman after a heart attack.

But he is modest about his accomplishments. "I saw some things that needed to be done and did them," he says. "But a fellow called John Jones, if he had a little common sense, would have made the same decisions. And there were a lot of other people involved besides me."

I CAME ON the scene at the best possible time. If I was an outsider, and you told me the history of the computer business and you said, "Now, what would have been the best time to enter the business?" — I would have said, "Just after World War II, when I entered it." And if you said, "When do you want to leave?" I would have said, "Somewhere in the mid-1970s." So I was very, very lucky. I considered calling my book *The Right Place at the Right Time* or *Blind Luck*, because that's the way I feel about it.

There's lots of mileage left in the electronics industry. That doesn't mean just computers — it means everything that stems from those little chips.

The industry is moving into the medical field. Our country has tremendous medical costs now, and these costs have to come way down. One way to do that is by using computers. The automobile industry is a huge, bright industry for our products, too. Now there are little computers filling automobiles, making them more efficient and dependable.

[The electronics industry is] getting pretty lean now, and I think we'll see a big turnaround.

The initial breakthroughs are still being made in this country, but the Japanese have found a way to shorten the development process and get these things into production quicker than we [do]. Sometimes they commercialize in areas that we never thought of.

We've got to learn to create and adapt and to sell at lower prices. We can't get protection from Japan just by pricing alone; we need to learn to be better manufacturers.

We should resist transferring America's top electronic technology to anybody. As a nation, if we invent something that is terribly important, I'm for controlling the export of that item. I would have been quite reluctant to see high-density memory chips transferred abroad so quickly. The Japanese had them, too, so it was a real horse race.

On the other hand, the ability to restrict transfer has not proved to be a very useful one in the last 40 years because the Russians, even though they are pretty crude in development, got their bombs soon after we did. So we in this country cannot hold technological advances from going forward for more than a year or two because they seep out. But the transmitting of American technology through dissatisfied employees is perhaps on the decline because American companies have gone to the wall on these things.

Whether the bigger companies succeed or don't succeed, I haven't a clue. There are some that have done tremendously well in the last 10 years. Apple got so big that the creative fellow who put it together couldn't manage it anymore, and John Sculley is doing a terrific job with it.

Watson is reluctant to talk about today's IBM, but it's clear where his sympathies lie.

I am terribly sorry that IBM finds itself in its present dilemma. I don't know why it's happened; only the people who are working inside the industry could possibly know the reason. I have a feeling that you can build a colossus company if you're only building automobiles, because your parts count is relatively few. But if you're building computers and all of the allied memories and other things that go into it, the parts count goes way up. That has been a great problem because you tend to try to make sure that each part will fit as many different machines as possible. And this slows the process down.

> **"I made a thousand mistakes, and I was misunderstood in a thousand other instances."**

It was much easier for me to have a constant cash flow than it has been for my successors because I had a very large rental equipment business. John Akers was the first fellow who had to generate all those billions of dollars without any rental feed-in.

I'm very sympathetic, but the company must pull up its socks and get going. I think that the reorganizations that John Akers is making are bound to pay off by enabling IBM to compete better. We're lucky to have him.

I really don't know anything about IBM; I would like to make that very clear. I have no advance figures, and I don't see anybody over there. I'm maybe asked to luncheon with Mr. Akers once every six months or so, which is fine with me and fine with him. So I am really, truly cut off by my own wishes.

IBM has been in other tight spots before. When we got into computers, we were second to Remington Rand. They had the knowledge, the people. We were totally unprepared to do what we did over the next 20 years. We had almost no graduate engineers, no electronic engineers. But we made a kind of arbitrary decision to get a massive engineering organization up. We went from 2% [of our budget spent on] R&D to 10% in about four years, and we hired engineers like they were going out of style.

I made a thousand mistakes, and I was misunderstood in a thousand other instances. We made a machine called the Stretch, and that was supposed to pull us into lead technology. Unhappily, when the Stretch machine came out, the cost overruns were high.

I raised heck in a meeting, and I think everybody got the feeling that I didn't want to push the upper end as hard anymore. And so we lost three or four years until I was able to say I'd been misunderstood. Then we tried to catch up with Cray in a number of different ways. I don't think we were ever really successful in the specialized, high-performance area.

I believe IBM will do well in the future, and that is where my hopes and my prayers are.

Interview by Johanna Ambrosio, CW's senior editor, systems and software.

Photography by Joyce Ravid

CYBER FRONTIERSMAN

Mitch Kapor

Few of Mitchell Kapor's high school classmates might have predicted he would one day co-craft Lotus 1-2-3, the most successful computer application of all time, or thought he would be worth over $200 million and lead an increasingly vocal computer policy group. In fact, few would have bet on Mitch Kapor even becoming a good computer programmer.

A self-described "smart kid who didn't quite know what to make out of himself," Kapor spent his immediate post-Yale University years drifting between jobs as a $160-a-week disc jockey, transcendental meditation instructor, student at MIT's Sloan School of Management (he dropped out), mental health worker, computer programmer and Apple II consultant. He started his own company, Kapor says, by simply following his "karma."

Today, the 41-year-old founder of Lotus Development Corp. manages his affairs from a windowless office in the shadow of Lotus and MIT. Plastic Japanese movie monsters and thick volumes of *Books In Print* punctuate the wood shelves.

As chairman of On Technology, Inc., Kapor has kept active in the software industry. But his first love is the Electronic Frontier Foundation, a cyber-activist group that is promoting debate about public networks and individual rights in the electronic age.

THIS YEAR WILL BE the 25th anniversary of my high school graduation in June 1967. I was 16. I was going to college in the fall; my event horizon was about a week. It was the summer of love and Haight Ashbury; it was the month that Sgt. Pepper came out. I was kind of into sex, drugs and rock 'n' roll.

This sometimes gets lost, but I go back to computers, hands-on, to 1964. I built a little computer for a science-fair project in junior high school. A little adder, 10 flip-flops with a telephone dial for input. I had some National Science Foundation-sponsored enrichment courses in the summertime and at Columbia University in the mornings and on Saturdays. I had one computer programming course in my high school.

I was very ambivalent because I loved computers and I hated them.

I found something really compelling and fascinating about the orderliness. At the same time, I really hated computers because it was very difficult to get them to do anything.

As it turns out, there are a number of talents that I don't have: I can't sing very well, and I can't program very well. So I was just turned off because the whole reward system seemed to be oriented to people who could program well. It was a love/hate relationship.

I didn't have a clue that I would start a business. My father ran a small business, and he always discouraged me from thinking about that. He wanted me to be a college professor because that's what he wanted to be, only it didn't work out.

Back in the '60s, it was possible to wander through life and not be in poverty and not really be going anywhere. You could sort of maintain a semimarginal existence indefinitely. I never made more than $12,000 a year, but I was never starving.

I wasn't unhappy. But on the other hand, I wasn't happy either. My life didn't have a direction. My parents weren't happy. I had been married once; I had gotten separated again. I was drifting. Today the economic pressures on young people are a lot stronger; instead of drifting, people have jobs they hate. My whole notion was to do interesting things, do what I wanted to do and not have a 9 to 5 job. I was kind of an intellectual gypsy. I figured by starting a company I could do what I wanted to do and not live a marginal life.

[A student I know at Harvard Business School] was telling me that he had just done the Lotus case in his finance course. Apparently, the class had an enormous amount of trouble understanding that I told [Lotus venture capitalist] Ben Rosen there were some things more important to me than making a profit, such as ensuring that the work environment was a good one. The students said: "This must be a clever manipulation to get a higher valuation." The instructor said the thing to understand is that people who grew up in the '60s and '70s were weird. How sad it is.

It would not ring true to say that somebody who did Lotus and made all this money doesn't care about money. But it was never a principal motivation. Even in the height of building the company, [money] was as much a way of keeping score as anything else. At a certain point, pre-Lotus, it did occur to me that you could make a lot of money on this, and that would be a good thing.

The first big money I saw was when [Dan] Bricklin and [Bob] Frankston starting getting royalties on VisiCalc. Being financially independent and not having to worry about where the next paycheck was coming from forever became a goal at a certain point.

"I didn't dream of making something as large as Lotus; it would have been completely psychotic to make that a serious goal."

I didn't dream of making something as large as Lotus; it would have been completely psychotic to make that a serious goal.

Personal computers today are very mainstream. But they were not when I started. The frontier moves. Today it's not desktop productivity; that's a well-settled piece of territory. It's not spreadsheets. Maybe it's virtual reality, maybe developing one of the first commercial services on the Internet.

There are plenty of net hackers who are hatching businesses on the side. You've got to go out on one of the edges, which is totally appropriate for people in their 20s. And that's where I would expect to be if I were starting out today.

With this profusion of information technology, we're shifting to an information-based economy. What that means — and whether it's any better for people — is still very murky. There's no discernible improvement in productivity, at least the way they measure productivity. Certain classes of people can now work on their own as consultants or free-lancers and pick and choose their assignments. I think that's a good thing.

It will take 20 to 30 years to switch from mainframe-based architectures to distributed architectures. That is a geologic time scale compared to how rapidly the technology is moving. But the corporate sector moves at a cultural pace, not at a technological pace. They move as rapidly as the company can depreciate its investment . . . and train a new generation of workers. That's a slow-moving kind of thinking compared to 30% annual improvement in MIPS.

Some people are looking to technology for some sense of transcendence. I think that's a very natural, almost inevitable human tendency. But clearly drugs were not the answer, and I don't think technology is the answer. If people are just wandering around, lost in cyberspace, it's another one of the myriad of diversions that we can invent to amuse ourselves and to distract ourselves.

On the other hand, if technology use is somehow connected with bringing people closer to each other, to form a community, to let people who would be otherwise out of touch or alienated from each other or alone into a world with each other, then it's very good. It's good to the extent it gives people a sense of possibilities or unboundedness or just the fact that there is more to existence than the mundane. But it has got to be channeled into some activity, quest, object, life, work.

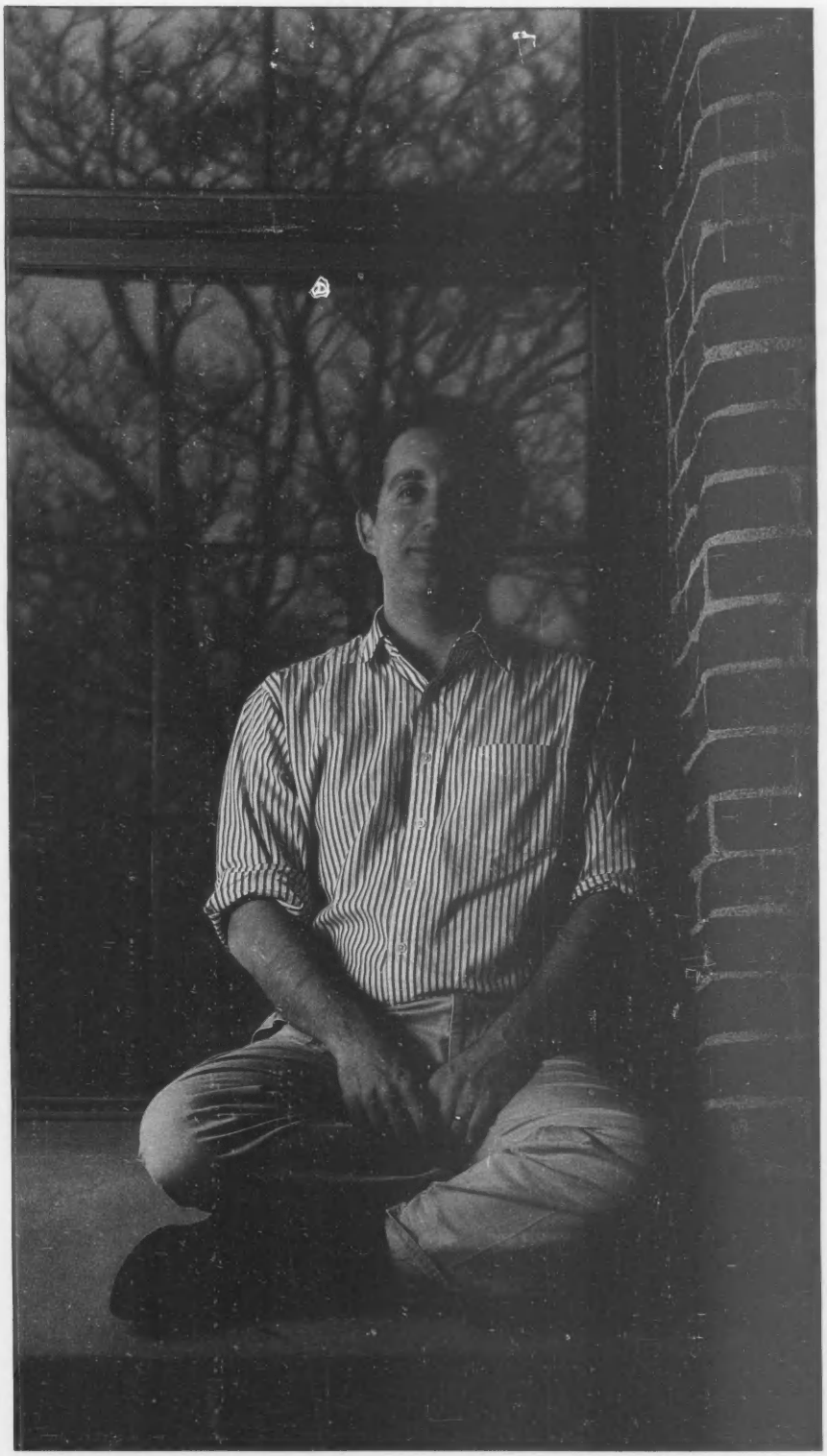
There's one area that I think technology can have a big impact in: Helping people form communities. It might be disabled people finding out that they are not alone. Or it might be Star Trek fans or disabled Star Trek fans. Name a human attribute, characteristic, interest, avocation and there's probably already a bulletin board devoted to it. Coin collectors. Left-handed libertarians. Greenpeace. Neo-Nazis. Technology doesn't discriminate.

I think at heart, people really do care about the condition of their neighborhoods, the school systems and the cities and towns they live in. Yet the level of public participation in government . . . is at an all-time low. There is a real sense of almost hopelessness about the ability of one individual or any small group of people or any community to have an impact on big issues like health care, the environment, unequal distribution of wealth. We're drowning in information; we know that there are huge problems, but people don't feel empowered.

Creating virtual communities and neighborhood back fences and digital street cafes is a way of starting to get people talking again. Out of the myriad of discussions, the momentum to actually do something will begin to arise, and programs will follow.

So the network is a medium for revitalizing democratic institutions. Town meeting. Cafe. Lecture hall. Community. There are lots of different institutions that will have their equivalents in the on-line world.

"My aspiration is to do the right thing, to do well, to be responsible, to leave the world a better place, to make a contribution and one that's in tune with my own gifts and talents."



It's early. We haven't built the communications equivalent of the interstate highway system yet; it's still mostly back roads and a few highways. We haven't seen the big social changes yet. The automobile created the suburb, and the suburb has been one of the major factors shaping the lives of Americans since World War II. What are the suburbs of cyberspace? I don't think anybody knows yet.

But technology will be used for good and bad by all manners of people and by criminals. This is already the case, so we need to be concerned about forming social policies that we are going to be happy with. We still have an opportunity now with computer-based communications to shape the future of the media. These networks we are building will eventually reach into every home and every office. Who do we want to own them? How do we want to control them? What should people be allowed to do? How is people's privacy going to be respected in these new media? How is the First Amendment going to live on in these new media? It's really a wonderful time to be on the frontier.

There is a dawning realization in the industry that the interest of computer firms like Apple, IBM and Next and so on are very much tied up in what we do with communications infrastructure. If there is no network, there is no market for these [computer] engines.

The downside is that we could wind up building something where you could get 10,000 channels of video junk into your home. That would be a real lost opportunity.

Everybody should be [active in the policy debates] to whatever extent they can. Look, I've been fortunate: I've been blessed by having the ability to commit my time and money where I want.

But there are lots of things that everybody can do, [even] people with other commitments. It's more a question of interest and will.

There's a Yiddish word, mensch. That's my aspiration: To be a mensch. To do the right thing, to do well, to be responsible, to leave the world a better place, to make a contribution and one that's in tune with my own gifts and talents. And if I can do that and be a good father for my kids, I'm a happy guy.

Let me say something pompous: This is a journey of self-discovery. Ever since I was little, I had my eye on the screen and tried to find a good spot right at the edge, where it was really hot and exciting, where I could do something or make something or be something and finish the chapter and move on. That's my karma.

Interview by Joseph Maglitta, CW's senior editor, executive report.

Photography by Alan Levenson

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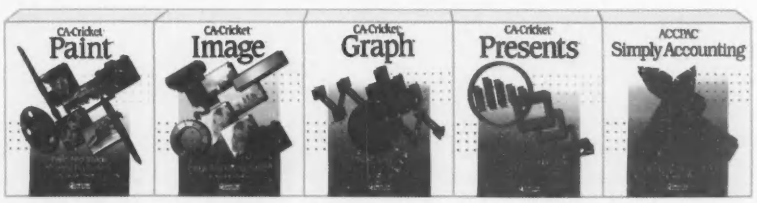

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NEW PRODUCTS

Network management

Epoch Systems, Inc. has introduced EpochBackup, a network backup application.

EpochBackup brings mainframe-class automated backup capabilities to Unix network environments. Files that are located throughout the network can be backed up and restored automatically on heterogeneous Unix workstations and servers to an Epoch data server.

EpochBackup has automatic error recovery and provides tools and templates for automatic scheduling. Reporting capabilities include log files, backup completion/failures, missing backups, user recoveries and audit trails.

EpochBackup prices start at $5,000.

Epoch Systems
8 Technology Drive
Westboro, Mass. 01581
(508) 836-4300

Ontrack Computer Systems, Inc. has announced NetUtils 3, a data recovery and protection utility for Novell, Inc. NetWare 3.X file servers.

NetUtils 3 utilities consist of three hard disk diagnostic and repair programs: NetScan, which searches for and repairs file structure errors; NetFile for recovery and maintenance; and NetDisk, a sector editor. By scanning for bad blocks, users can repair server problems and automatically move the data to safe locations.

The capabilities of checking or repairing cross-linked files or lost blocks and viewing and modifying data in either hexadecimal or ASCII format are included.

NetUtils 3 costs $395.

Ontrack
6321 Bury Drive
Eden Prairie, Minn. 55346
(612) 937-5161

Customer-premises equipment

Radish Communications Systems, Inc. has announced the VoiceView system.

The product enables telephone users to conduct integrated voice and data transactions over a telephone line. Users can make ordinary telephone calls to each other and exchange data while talking.

The Voice/Viewset is a viewing screen that receives integrated voice and data transactions. The Voice/Viewbridge links the telephone, telephone line and personal computer. Voice/Viewware software lets PC users send the contents of a PC screen or file over standard telephone lines with a normal voice call.

The price for a standard system configuration starts at $27,995.

Radish Communications
Suite 184
1705 14th St.
Boulder, Colo. 80302
(303) 443-2237

Biscom, Inc. has introduced the Faxcom 5000, an enterprise fax server.

The Faxcom 5000 is a hub fax server that connects into a corporate data network. It simultaneously provides imaging and inbound and outbound fax services to all corporate computer systems, including local-area networks, midrange systems and mainframes.

The Faxcom 5000's intelligent fax ports can be configured to act as entry points for received faxes for distribution across the corporate data network. Data network connectivity options include support for Ethernet, Token Ring, X.25 and RS-232.

The Faxcom 5000's price starts at $24,980.

Biscom
Forest Ridge Research Park
85 Rangeway Road
Billerica, Mass. 01862
(508) 670-5521

Gateways, bridges, routers

Shiva Corp. has announced that it will start shipping rack-mounted versions of FastPath 5, the Apple Computer, Inc. AppleTalk-to-Ethernet gateway.

FastPath 5R rack-mounts one or two FastPath 5s in an enclosure mounted on a standard 19-in. rack. Four FastPaths can fit into the space of one gateway. FastPath 5 routes multiple protocols, including Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, AppleTalk Phase 1 and 2 and 1PTalk.

The FastPath 5R costs $2,799 for a one-unit configuration and $5,399 for a two-unit configuration.

Shiva
One Cambridge Center
Cambridge, Mass. 02142
(617) 252-6300

McData Corp. has introduced the LinkMaster 7200 Network Concentrator.

The series of products concentrates numerous remote Synchronous Data Link Control (SDLC) lines into either a single SDLC line or Token Ring for host communications. The LinkMaster 7200 Network Concentrator supports mainframe connections via an X.25 line and features remote operation and diagnostics and IBM's NetView-based network management.

Three models provide a range of functions: Model 1 concentrates on SDLC communication lines. Token Ring attachment for 3270 devices is provided by Model 2. Model 3 connects 3270 Systems Network Architecture X.25 lines to a front-end processor host gateway.

Base model prices start at $7,995 for Model 1 and $9,650 for Models 2 and 3.

McData
310 Interlocken Pkwy.
Broomfield, Colo. 80021
(303) 460-9200

Advanced Computer Communications has announced price reductions of up to 26% for its Series 4000 bridge/router products.

Introductory pricing for the ACC 4100 is now set at $4,950, down from $5,500. The basic configuration for the ACC 4200 now costs $4,000, reduced from $5,500.

Advanced Computer
720 Santa Barbara St.
Santa Barbara, Calif. 93101
(805) 963-9431

Harris Adacom Corp. has introduced CoaxNet, a local-area network bridge.

CoaxNet attaches personal computers with 3270 coax boards to a Novell, Inc.-based LAN. The product attaches to either a Token Ring or Ethernet Novell LAN. Up to 32 attached PCs can access LAN services via the CoaxNet as if they were directly attached to the LAN.

CoaxNet for Ethernet costs $7,000; CoaxNet for Token Ring costs $8,000.

Harris Adacom
16001 Dallas Pkwy.
Dallas, Texas 75248
(214) 386-2000

Retix has announced the Routerxchange (RX) 7000, a multiprocessor IBM RISC System/6000-based internetworking product.

The new system is a 12-port, multiprotocol router for organizations that are implementing large backbone networks. The RX 7000 is the first router to offer Asynchronous Transfer Mode support.

The RX 7000 provides users with multimedia connectivity among Fiber Distributed Data Interface, Ethernet and Token Ring networks or a combination of the three. A new Parallel Routing Architecture — an RS/6000-based architecture consisting of multiple parallel processors for routing and a separate processor for path control and management — is incorporated.

RX 7000 prices start at $9,200.

Retix
2401 Colorado Ave.
Santa Monica, Calif. 90404
(310) 828-3400

Micro-to-host

Computer Logics Ltd. has released Handshake/HLCN and Handshake/LCW, high-speed connectivity solutions for Unisys Corp. A series mainframe users.

The products feature multiple terminal dialogs, advanced file transfer, host pass through printing and dynamic on-line configuration.

New to this release are workstation packs. The packs — groups of eight workstations — can be run from a local or network drive and offer shared access among all local-area network workstations.

Handshake/HLCN and Handshake/LCW cost $530 each.

Computer Logics
31200 Carter St.
Solon, Ohio 44139
(216) 349-8600

Pacer Software, Inc. has announced the availability of Macintosh-to-VAX connectivity, with PacerConnect terminal services for VMS.

Apple Computer, Inc. Macintoshes networked to Digital Equipment Corp. VAX/VMS hosts receive terminal emulation connections and file-transfer service from PacerConnect.

The product supports LocalTalk bridged to Ethernet and direct Ethernet connections and consists of file-transfer tools on the Macintosh and host-resident software for Apple Communications Toolbox and the VMS system.

PacerConnect costs $2,000 per host.

Pacer Software
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La Jolla, Calif. 92037
(619) 454-0565

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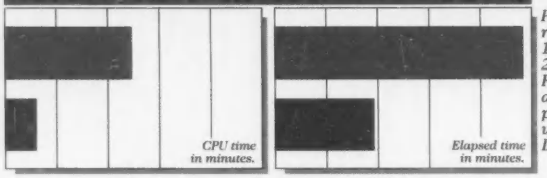
PLATINUM *Rapid Reorg*™ vs. DB2 V2.3 REORG Utility

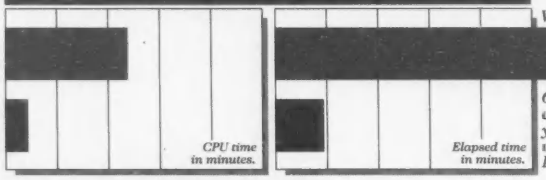
On a 67,700 page tablespace, PLATINUM Rapid Reorg used 3.34 minutes of CPU time compared to 12.68 minutes for the IBM REORG utility. That's a 73% CPU time savings with PLATINUM.



PLATINUM Rapid Reorg's run of 9.57 minutes was 158% faster than IBM's 24.72 minute result. Running PLATINUM also improved EXCP performance. Our run used 35,282 while IBM consumed 54,000.

PLATINUM *Fast Load*™ vs. DB2 V2.3 LOAD Utility

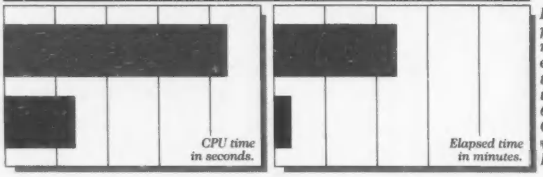
On the same 67,700 page tablespace, PLATINUM Fast Load used 2.82 minutes of CPU time compared to 12.58 minutes for the IBM LOAD utility. That's a 78% CPU time savings with PLATINUM.



With performance nine times faster than IBM LOAD (4.82 minutes vs. an off-the-chart 43.45 minutes) and 69% fewer EXCPs, all we can say is, "Wait until you see the numbers for our soon-to-be-released PLATINUM Fast Unload."

PLATINUM *Quick Copy*™ vs. DB2 V2.3 COPY Utility

For an image copy of a 67,700 page tablespace, PLATINUM Quick Copy used 12.62 seconds of CPU time compared to 42.49 seconds for IBM. That's a 70% CPU time savings.



PLATINUM Quick Copy's performance of 2.87 minutes was more than eight times faster than the 23.38 minutes it took IBM to copy a 67,700 page tablespace. Our 88% time savings were topped by an EXCP reduction of 90%.

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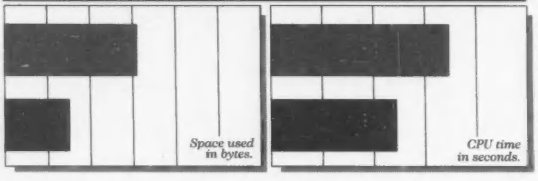

In terms of processing speed, our UTLD9 compression routine maximizes productivity. On the same 590,000 byte test table, our .484 second performance topped IBM's .689 second time to yield a 30% CPU time savings.

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Trials run using DB2 V2.3 General Availability release of 10/24/91. *DSNSHUFF, provided as source code with DB2 V2.3.

Taco Bell takes big bite out of operations costs

BY JOHANNA AMBROSIO
CW STAFF

Like a little red-hot salsa, a little operations planning goes a long way. A year into a strategic operations overhaul, Taco Bell Corp. has netted $200,000 in savings, a more satisfied staff and a better idea of how to meet future business requirements.

The $200,000 in savings was accrued from renegotiating maintenance and lease contracts that had been handled by another Taco Bell group.

"I kind of knew what was wrong, but we needed a more formal plan than what we had," said Barbara Peikert, manager of computer operations at the Irvine, Calif.-based fast-food chain. "People really wanted to do a good job, but they didn't know what to do."

Help from outsiders

Shortly after taking over the operations management job in the second quarter of last year, Peikert began a high-level evaluation of the data center's charter, which included a look at personnel issues. As a result, Taco Bell hired a data center supervisor and several other staff members.

"We didn't have people who were rising to the top as leaders very quickly. We needed outside expertise," Peikert said.

Part of the problem was a 35% staff turnover rate in the U.S., a level Peikert termed unacceptable. "We wanted to give people a reason to stay," she said. As a result, there is now a better defined career path for operations personnel.

Taco Bell's growth rate — over 20% annually — has been a mixed blessing, she said. "It's a nice position to be in because we're changing so quickly, but it's hard to keep up with the changes."

In addition to the 3,500 restaurants in the U.S., there are Taco Bell carts, kiosks and concessions located in airports and gas stations across the U.S.

ON SITE

Taco Bell Corp.
Irvine, Calif.

- **Challenge:** To identify data center savings.
- **Strategy:** Institute long-range planning process for operations.
- **Results:** Save $200,000 by renegotiating maintenance and lease contracts; reduce staff turnover; operations group is better positioned to support company's 20% annual growth rate.

Fast-food comparison

Along with the "1,000-foot" look at the operations side of the business, Peikert and her staff gathered benchmarks from other Pepsico, Inc. properties, including Kentucky Fried Chicken Corp. and Pizza Hut, Inc., to see how Taco Bell stacked up.

She also engaged consulting firm Booz Allen & Hamilton, Inc. to compare Taco Bell with other shops of the same size.

Part of that study involved interviewing information systems managers and people in the financial group — the data center's primary clients — to "tell us what we should look like, our strengths and weaknesses, and what we should focus on."

The study also inventoried hardware and software performance and discussed industry and technical trends.

"No glaring problems" were found, although Peikert said the job failure rate was three times the rate for a shop Taco Bell's size. So the company is now instituting policies and procedures to help decrease that rate.

As a result of the strategic look at the data center, Taco Bell is focusing on the following items this year:

- Implementing automated operations and direct-access storage device management.
- Restructuring the data center organization to combine the operations and production-control functions, define new positions and provide more training.
- Establishing service-level agreements with end users.
- Improve the layout of the data center to foster better communication among staff members and with clients.

The latter point is critical, Peikert said. She is now marketing the operations group and takes users on walk-through visits to "demystify what's in the freezer."

Peikert suggested that all companies make time to take a long, hard look at their operations.

"People say they're too busy with the day-to-day to be strategic. But you have to make time at night and on weekends, or else you're just being reactive and not proactive. This has really given us control over our destiny," she said.

DEC to unleash tools for Alpha end users

Series to ease software portion of migration

BY MELINDA-CAROL BALLOU
CW STAFF

Digital Equipment Corp. will be offering a series of tools to end users to facilitate the process of migrating VMS and Ultrix software to the company's next generation of Alpha systems, according to company officials.

These tools supplement DEC's GEM cross-compiler, which will allow user sites to port applications written in multiple high-level languages to Alpha VMS and Alpha OSF/1 and to DEC's Macro compiler for low-end languages.

Independent software vendors and others have already been porting their applications by using these tools under the auspices of DEC's Alpha Migration Research Project over the past year.

VESTed interest

If a VMS user site does not have access to source code, for instance, DEC is offering translation tools that include VAX Executable Software Translator (VEST) and Translated Image Environment (TIE).

Although the translation process involved with these tools causes performance degradation, there are advantages to using them even when source code is available, according to early users. They can be used for analysis or in an effort to discover VAX dependencies and to then resolve those dependencies.

VEST creates an Alpha executable image from VAX instructions. That image can then be run on Alpha machines using TIE, which provides a virtual VAX machine to process VAX calls. A third tool, which has now been incorporated into VEST and is called Tool Which Evaluates Executable Dependencies (TWEED), helps out when the images produced by VEST will not run properly.

TWEED requires availability of the original source code and will inform users about what they need to change at the level of the source code in order to get the VEST images to run.

A fourth tool, which was dubbed Mannequin, was used by developers to simulate how their programs would run on Alpha machines. However, Mannequin will not be available to end users, however, and is no longer used in-house at DEC, according to DEC officials.

Key elements

"DEC's sartorial migration tools are going to be an essential element in terms of doing the conversion because they let us move applications even if DEC doesn't supply the compilers or if we don't have source code," said Jeffrey Jalbert, president of JCC Consulting, a consulting firm in Granville, Ohio, and recent chairman of Digital Equipment Computer Users Society's VAX to Alpha Systems Transition committee.

However, for large, complex applications such as the SAS Institute, Inc.'s SAS System, the performance degradation involved was prohibitive, although developers used the tools in analysis mode to get a sense of VAX dependencies.

"For any application where performance is critical, these translation tools are useful to

Continued on page 96

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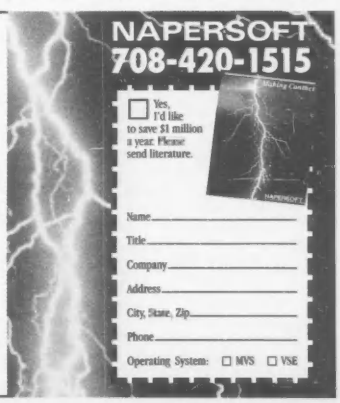

Avalon revamps application strategy

BY JEAN S. BOZMAN
CW STAFF

TUCSON, Ariz. — Avalon Software, Inc. (formerly IIS, Inc.) is in the middle of a makeover, changing its name and updating its relational database management system-driven manufacturing applications in recent months. But the $5 million firm must overcome two decades of selling niche-oriented manufacturing resource planning (MRP) software if it is to grow into a major vendor, analysts said.

Avalon announced this month the latest release of its core product, CIIM 8.5, for the Oracle Corp. and Sybase, Inc. RDBMSs. The 12 modules in CIIM support interrelated financial and manufacturing applications. Avalon has a small installed base of about 125 customers, including Deere & Co., General Dynamics Corp., Saab-Scania AB and the New York Blood Center.

But the firm is seeking to double or triple in size over the next few years. In February, it installed a new marketing team, headed by two former Oracle executives: Gary Gibson as chief executive officer and M. R. Rangaswami as vice president of marketing.

"They have some marketeers running the company now, where last year you had technologists," said Erik Keller, a program director at Gartner Group, Inc.'s Computer Integrated Manufacturing service in Stamford, Conn. "IIS was built on a consulting model, and you can't grow a company very quickly that way. Too many people on staff were writing the code."

Avalon faces stiff competition. But its sales force is prepared to coexist with $1 billion Oracle's manufacturing applications and to compete with dozens of companies moving their old MRP programs to RDBMS technology. At the same time, analysts noted, $400 million The Ask Cos. is adapting its aging ManMan manufacturing software to a new technology based on Ask's Ingres RDBMS.

VMS first

Avalon's marketing campaign will begin this summer with plans to ship production code for CIIM 8.5 in August for Digital Equipment Corp.'s VMS and several Unix platforms. CIIM has been running on Oracle since 1985 and on Sybase since 1991, the firm said. Before the mid-1980s, the software was programmed in Basic to run on DEC's PDP-11 computers.

Over the next five years, Avalon plans to re-engineer CIIM, breaking its 12 modules into smaller segments. That way, Rangaswami said, users will be able to create custom solutions from off-the-shelf manufacturing packages. Avalon plans to offer consulting services to help users plan CIM systems.

The abrupt technology transition in the MRP marketplace will enable small firms such as Avalon to grow, provided they move quickly. "The technology is allowing these small firms to move away from proprietary technology," said Clare Gillan, manager of the Applications Solutions group at International Data Corp. in Framingham, Mass.

"Before this, they were successful in small niche markets," Gillan said. "Now that the MRP market has matured, they realize they need to move to fresh technology."

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Document Management Representative

When a major health insurer suddenly doubled its customer base, their MIS department quickly predicted disaster. The company's in-house document publishing system was already overloaded. They had to drastically cut the time it took to produce vital documents or risk the company's reputation for customer service. That's when they called Lynn Wells and the Xerox team.

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DEC to unleash Alpha tools

CONTINUED FROM PAGE 95

bootstrap code or for analysis but not for more than that," said Tom Cole, manager of VMS development at SAS.

Developers at the Mayo Clinic in Rochester, Minn., found that the tools were helpful in terms of getting an idea about how well their programs were going to execute.

"They were very useful," said Brian Shamblin, computer systems manager at the Mayo Foundation, which is the parent organization of the clinic. "And overall, the migration process was surprisingly easy."

Shamblin added that the biggest problems his group experienced had to do with VAX-specific dependencies and lack of ANSI C compliance in his site's applications. DEC's earlier VAX/VMS C compiler allowed developers to be more relaxed in their programming practices than the Alpha GEM C Compiler. DEC has added a VAX C compiler mode to the company's GEM compiler to facilitate the process of moving over code that is noncompliant with ANSI standards.

The most difficult part of migrating to Alpha for Cole was having to redesign the company's code generator to take advantage of the parallel processing — the superscalar and super pipelining — available with the Alpha chip.

"The [GEM] compiler provides an enormous amount of assistance in helping to write efficient Alpha code, but it's easy to write a bad code generator for Alpha and hard to write a good one," Cole said. "Issues of data alignment and data sizing can be critical."

'I thought you had the code?'

Recovery service company restores lost source code

BY JOHANNA AMBROSIO
CW STAFF

Like great-grandmother's birth certificate that you know is somewhere in a trunk someplace, source code often gets lost or misplaced in the corporate attic. However, unlike some personal treasures, mainframe source code can now be restored through a service.

Source Recovery Consultants, Inc., a small firm in Frenchtown, N.J., offers a restoration service for approximately $2 per recovered line of source. Prices are based on the number of lines of code delivered, the size of the module being recovered and the priority of the job. Source code from most IBM mainframe operating systems, including MVS, DOS/VSE and VM/CMS, can be recovered for assembler, Cobol and other languages.

Source Recovery may evolve the service into a tool set that it can sell as a product in about a year, said Tom Storms, the firm's vice president. One of the three steps involves a homegrown expert system that translates the object code into native source language.

Service menu

The company provides different levels of service, from a basic level that delivers just the code to an advanced level that is fully commented and uses the shop's particular programming standards and file names. The latter analyzes what the program does.

"We can do it a lot faster and cheaper than customers can pay a programmer to do it," Storms said. The service "provides a direct translation of executable code back to the source language. Nothing is missing."

Founded in 1989, the company has had approximately 10 customers thus far.

One of customers, grocery distributor Richfood, Inc. in Richmond, Va., was missing source code for an accounting application.

Other Source Recovery customers are not willing to go public. "Everybody has this exposure, but the perception is that if I have this problem, I did something wrong," Storms said. "It's a very sensitive issue."

In fact, missing source code can result from any number of factors, including the following:

- The development machine goes down before the application being written is fully backed up.
- Developers leave the company, and their machine, with code, is erased.
- Conversion from one system to another makes it difficult to locate code.

"Companies often don't even know the source is gone until they try to make some changes to the program," said Patricia Seymour, principal of consulting firm Technology Innovations in Danville, Calif. "Sometimes you hope and pray there will be no changes so you can just keep an old system running."

Seymour said that whatever the reason, the ultimate fault lies with inadequate control over the corporate software assets. "It's a management issue. You need good version control, good configuration management." She said one answer is to institute a policy in which programmers check code in and out of a centralized library instead of keeping everything on a personal computer.

Melvin C. Porcher, project manager at Richfood, said his company has begun a quality assurance program and is converting over to a new change management system within the next six months.

IN BRIEF

CAD/CAM/CAE revenue to grow

■ Computer-aided design, manufacturing and engineering revenue is projected to grow 9.6% to $8.1 billion during 1992, according to figures released by Daratech, Inc., a Cambridge, Mass., market researcher. Market leader **IBM** is expected to increase its revenue by 7% to more than $2.3 billion and 29% of the market. Highest growth among the Top 10 vendors is expected from **Structured Dynamics Research Corp.** in Milford, Ohio, with 30% growth to $156 million, and **Autodesk, Inc.** in Sausalito, Calif., with a projected increase of 23% to $330 million.

■ Redundant arrays of inexpensive disks (RAID) is emerging as a cost-effective approach to disk storage, according to a study from **International Data Corp.** (IDC) in Framingham, Mass. IDC recently completed a survey interviewing 800 managers at U.S. mainframe, minicomputer and supercomputer sites that indicated customer interest in RAID is higher than expected: More than half of the local-area network site respondents said they are planning to implement RAID products.

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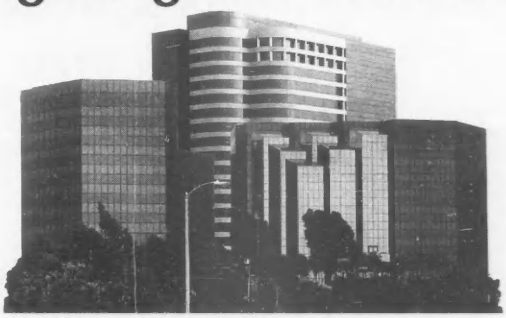

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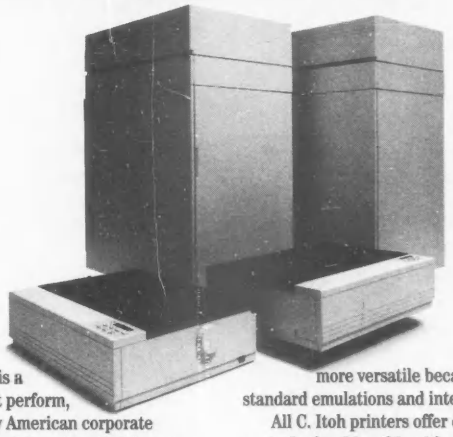

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HP strives to complete 68000-based series

BY MARK HALPER
CW STAFF

PALO ALTO, Calif. — Hewlett-Packard Co. may be striving to develop a Precision Architecture version of its fault-tolerant minicomputer line, but for now, it is rounding out its existing 68000 series.

The company last week added a low-end model manufactured by Korea's Samsung Electronics Co. to the Model 1200 series and said it is working on a port of its Softbench development environment for the fault-tolerant line.

At the same time, the company said it hopes to have a PA-RISC version ready by the end of next year. It is developing that machine with Sequoia Systems, Inc. in Marlboro, Mass.

HP targets its 1200 series of fault-tolerant machines primarily at the telecommunications market, where users tap them as adjunct processors to switching systems. The company is also branching out its marketing efforts into the health care and financial industries, said Raanan Peleg, business development manager for HP's Fault Tolerant Program.

In the health care field, HP recently began offering the 1200 series bundled with the Mumps integrated programming language and database management system. It is also talking to several third parties about adding a securities trading program, Peleg said.

The new 9000 Model 1210, co-developed for HP by Samsung and Sequoia, is priced at $165,000 for a base configuration that includes two 25-MHz 68040 microprocessors, 16M bytes of memory, a 3½-in. 880M-byte drive, a 2G-byte digital audio tape drive, an Ethernet card with Transmission Control Protocol/Internet Protocol software and a 32-user license of the HP-FX Unix fault-tolerant system.

The 16M bytes of random-access memory and 880M bytes are fully backed up with another 16M bytes and 880M bytes, Peleg said. The 3½-in. drive marks HP's first use of that form factor in the 1200 series. HP plans to ship the 1210 in the fourth quarter and will eventually offer a version with an 8G-byte, high-compression tape backup, Peleg said.

A typical 1210 telecommunication user would install the machine to help sift through small databases, such as those that contain information on special services users or on cellular users phoning outside their home area, Peleg said. The larger 1200 series machines are used for sifting through toll-free phone numbers and other large databases.

Like HP's other fault-tolerant systems — the 20-MHz 68030-based Model 1240 and the 25-MHz 68040-based Model 1245 — the 1210's HP-FX operating system instructs processors within milliseconds to take over for a failed processor. That split-second downtime compares with typical downtime of about 20 minutes on redundant versions of HP's Series 800 line of minicomputers, which can be configured for highly available but not fully fault-tolerant operations, Peleg said.

HP prices its Model 1240 — a machine with less processing power but greater expandability than the 1210 — at $410,000 with 32M bytes of backed-up storage and a backed-up 560M-byte 5¼-in. hard drive.

A base configuration of the Model 1245 is priced at $570,000, including redundant 5¼-in., 1.1G-byte drives and 64M bytes of backed-up memory.

The Model 1210 is the first machine made for HP by Samsung. Sequoia makes the Models 1240 and 1245. Sequoia does, however, add HP features to the 1210 including disk and tape drives, C and C++ compilers and Simple Network Management Protocol, Peleg said.

Cray unveils SPARC system

EAGAN, Minn. — Scalable Processor Architecture (SPARC) computers achieved a new level recently when Cray Research, Inc.'s wholly owned Cray Research Superservers, Inc. subsidiary unveiled its Cray S-MP SPARC-based superserver.

The system was designed to perform distributed processing with SPARC workstations and other networked computer resources, according to the company. The S-MP can also act as a connection from workstations to other Cray Research supercomputers.

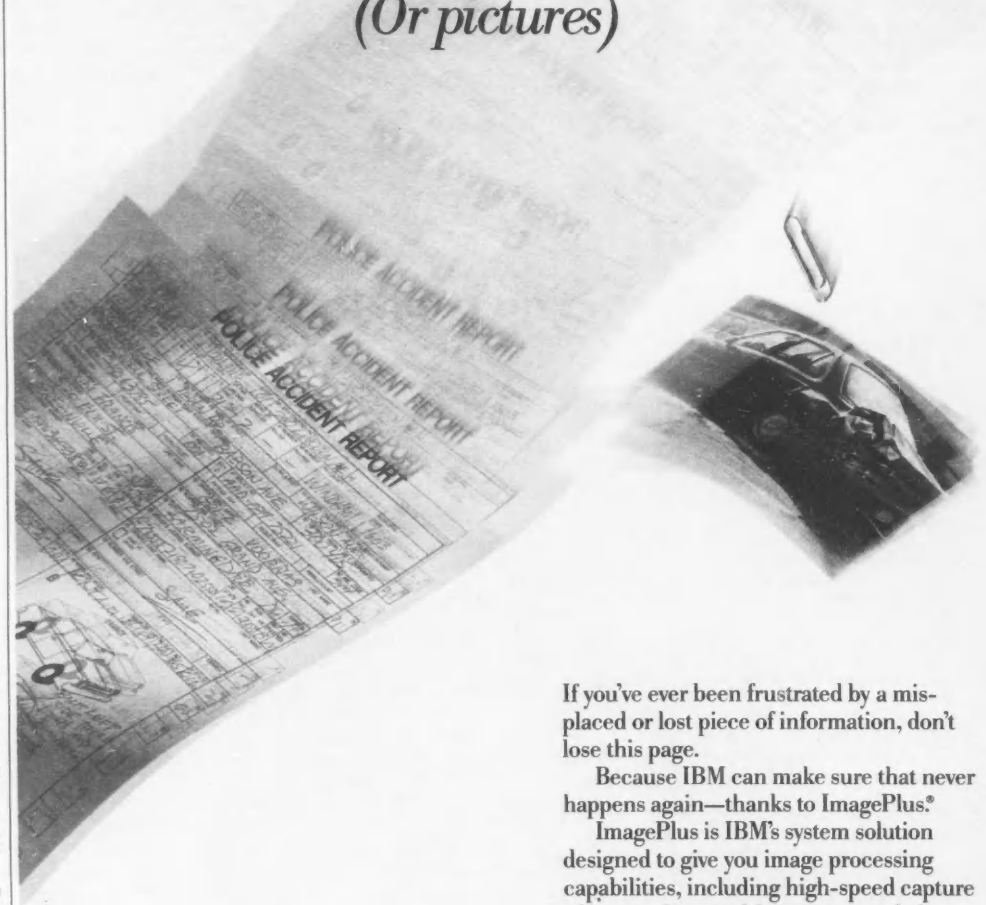
With its 1T-byte memory capacity, the system reportedly can be used for extremely large-scale projects beyond the capacity of normal workstations and servers, such as large finite element analysis, signal processing, mass storage management and distributed graphics projects.

Pricing for the system begins at $500,000.

Cray Research Superservers was formed from the assets of Floating Point Systems, Inc.

The secret of success is never being at a loss for words.

(Or pictures)



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Neural nets shift focus to vertical applications

BY DAVID KELLY
SPECIAL TO CW

Can neural networks help your company the way they helped Arnold Schwarzenegger in the movie *Terminator 2*? As the Terminator, Schwarzenegger was powered by a neural network that enabled him to create and adapt strategies.

Neural networks may not be powering companies to new heights, but they are not going away, either. They have progressed rapidly from a little-known research tool to an advanced but useful tool for information systems managers.

The International Joint Conference on Neural Networks, held two weeks ago in Baltimore, highlighted changes in the neural network field and the implications of those changes for IS managers.

Experts said the field is moving away from selling just tools to marketing vertical applications. "Companies have realized that they can't make much money selling the technology — they need to sell solutions," said Tom Schwartz, president of The Schwartz Associates, a consulting firm in Mountain View, Calif. The introduction at the show of a check-reading system by VeriFone, Inc. in Redwood City, Calif., is an example of this move toward vertical systems. Operating just like the swipe-through credit-card authorization systems used in stores, the VeriFone check system uses neural network technology to read the preprinted account information at the bottom of a customer's check.

Neural networks are now being used in combination with other technologies, such as fuzzy logic and expert systems. These "hybrid" systems can speed development time and provide more robust solutions. "New environments such as Windows 3.1 with DDE and OLE will make a big difference since customers now have the ability to mix neural networks, expert systems, fuzzy logic, case-based reasoning and other approaches together without having to buy into any one specific vendor's product line," Schwartz said.

Ford Motor Co. is one of many companies exploring the possibilities of these mixed systems. Ford's Dearborn, Mich.-based research laboratory has created a mixed fuzzy logic and neural network system to create a model of an active suspension for a car.

"I see a lot of promise in hybrid systems," said Lee Feldkamp, a Ford researcher. "There are many control systems in a car. We are trying to locate any that might benefit from these systems."

The following are three major areas of neural network development:

• **Financial.** "We've seen a strong interest in companies for using neural networks in the financial area for risk analysis, fraud detection and predictive modeling," said Neena Buck, vice president and director at New Science Associates, Inc., a consulting and research company in Southport, Conn.

Because of competition in the industry, few companies detail how they use neural networks in financial areas. However, Shearson Lehman Brothers, Inc. has revealed that it is using neural networks for stock market prediction, and The Chase Manhattan Bank NA is using them for detection of credit-card fraud.

• **Speech and image processing.** Just a few years ago, neural networks were portrayed as solutions to two difficult problems: natural language processing and handwritten character recognition. If that is the case, then where are the elevators that understand speech and the scanners that read faxes? They are on their way, according to industry consultants. A number of companies, including HNC, Inc. in San Diego and Nestor, Inc. in Providence, R.I., have released neural network-based products that have a limited ability to read handwritten numerals and characters.

In addition, Intel Corp. is currently working on extending its neural network chip, the 80170NX, for speech and image processing. The company expects experimental products for image and speech recognition based on Intel neural network chips, probably within two years.

• **Database exploration.** "One of the basic problems in business is that companies tend to have more data than expertise," said Joseph Bigus, senior associate programmer at IBM's Application Business Systems division in Rochester, Minn. "We see neural network tools, such as our Neural Network Utility/2, as providing them a way to use data in existing databases effectively."

Churchill Systems in Troy, Mich., developed a program using the IBM product, which sorts through a large hospital supply company's database looking for the inactive customers that are most likely to purchase again. Churchill Systems used the neural network to identify key characteristics of the best customers. This profile is then applied against the inactive customer list, yielding a set of high-probability purchasers.

Kelly is a free-lance writer in Waltham, Mass.

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NEW PRODUCTS

I/O devices

I-O Corp. has introduced the I-O 9380 Coax Interface, a coaxial interface product for IBM printers.

Simultaneous connection of both the host and personal computer is achieved with intelligent printer sharing features. The I-O 9380 Coax Interface offers a variety of printer emulations, supports 30 languages and has the ability to let users override host commands via the printer's front panel with an I-O Command Pass-Thru feature.

The I-O 9380 Interface costs $995 for a one-year Customer On Site Exchange (COE) warranty and $1,095 for a three-year COE warranty.

I-O
2256 South 3600 West
Salt Lake City, Utah 84119
(801) 973-6767

Applications packages

Xerox Computer Services, a division of Xerox Corp., has announced Chess Open Systems Manufacturing Resource Planning (MRP II) software applications for Digital Equipment Corp.'s Ultrix DEC-system platform.

Chess combines fourth-generation technology with functionality and was designed to fill the enterprisewide production, financial and distribution needs of manufacturing firms.

With the MRP II system, Chess delivers multivendor computing through its independence of database and operating systems and its portability on all major hardware platforms.

Chess for Ultrix prices range from $75,000 to $200,000.

Xerox Computer Services
5310 Beethoven St.
Los Angeles, Calif. 90066
(310) 306-4000

Macro 4, Inc. has introduced Deskpad, an electronic-mail, meeting scheduler and personal diary system.

Users can create their own distribution lists or use public lists that can be set up by any criteria that is important to the organization. Deskpad can call meetings, notify invitees, check the personal calendars of the invitees and advise of any scheduling conflicts.

Deskpad is generally available for the IBM VM operating system and is priced from $125 to $325 per month.

Macro 4
35 Waterview Blvd.
Parsippany, N.J. 07054
(201) 402-8000

Rocket Software, Inc. has announced Rocket for QMF Release 3.1, performance and administration products for IBM's Query Management Facility (QMF).

Features in this release include the capability to generate programs for CICS, an end-user facility for compiling programs, a QMF object use tracking and migration capability and stand-alone programs for portability. Rocket for QMF is made up of two integrated products: Rocket Compiler and Rocket Resource Manager.

Rocket Compiler prices start at $30,000; Resource Manager starts at $24,000.

Rocket Software
161 Worcester Road
Framingham, Mass. 01701
(508) 875-4321

Database management systems

Digital Equipment Corp. has announced its Electronic Data Control System II (EDCS II) for product data management.

EDCS II is now available on three client platforms: Intel Corp. 80386/1486-based personal computers running MS-DOS, reduced instruction set computing Ultrix systems and Sun Microsystems, Inc. Unix systems. The EDCS II data management system facilitates the tracking, change notification, access control, review/release control and archiving of data regardless of the application that was used to generate the data.

This release provides automatic change notification to users and maintains a complete audit trail for transactions. It also has a new Fetch From Archive command, which allows users to have direct access to archived data.

The EDCS II system costs $45,000.

DEC
146 Main St.
Maynard, Mass. 01754
(508) 493-5111

Platinum Technology, Inc. has announced Platinum Package/It for users of IBM's DB2 Version 2 Release 3.

Platinum Package/It analyzes plans, determines the benefits of converting to another package and automates part or all of the conversion process.

The Pre-Conversion Series determines the most efficient operation of packages on the user's DB2 subsystems. The Conversion Series can convert plans to make full or partial use of the packages. Version Management Services offers facilities for automatically deleting and maintaining plan revisions.

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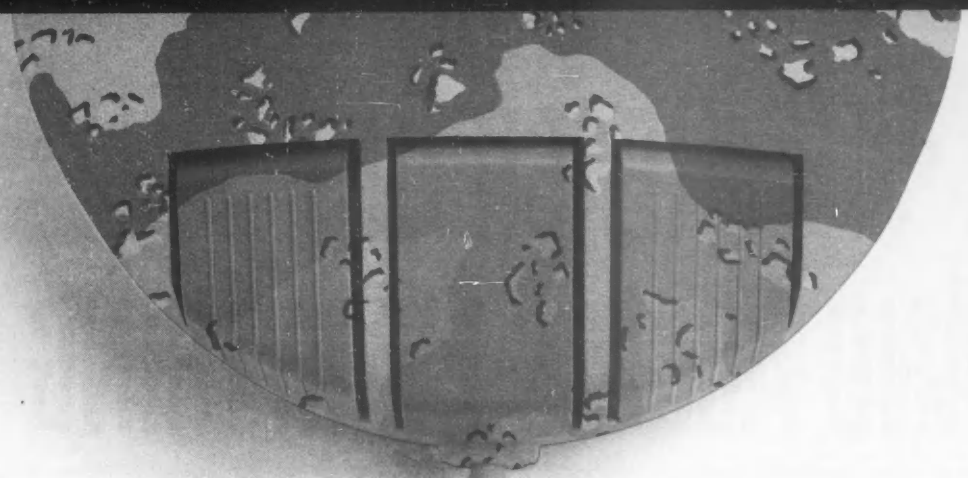

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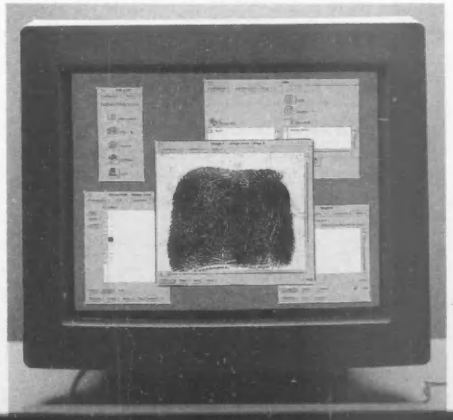

You can also see us at AIIM in Anaheim, CA, June 23-25, in the Sun Microsystems, Digital Equipment Corporation and Apple Computer booths.

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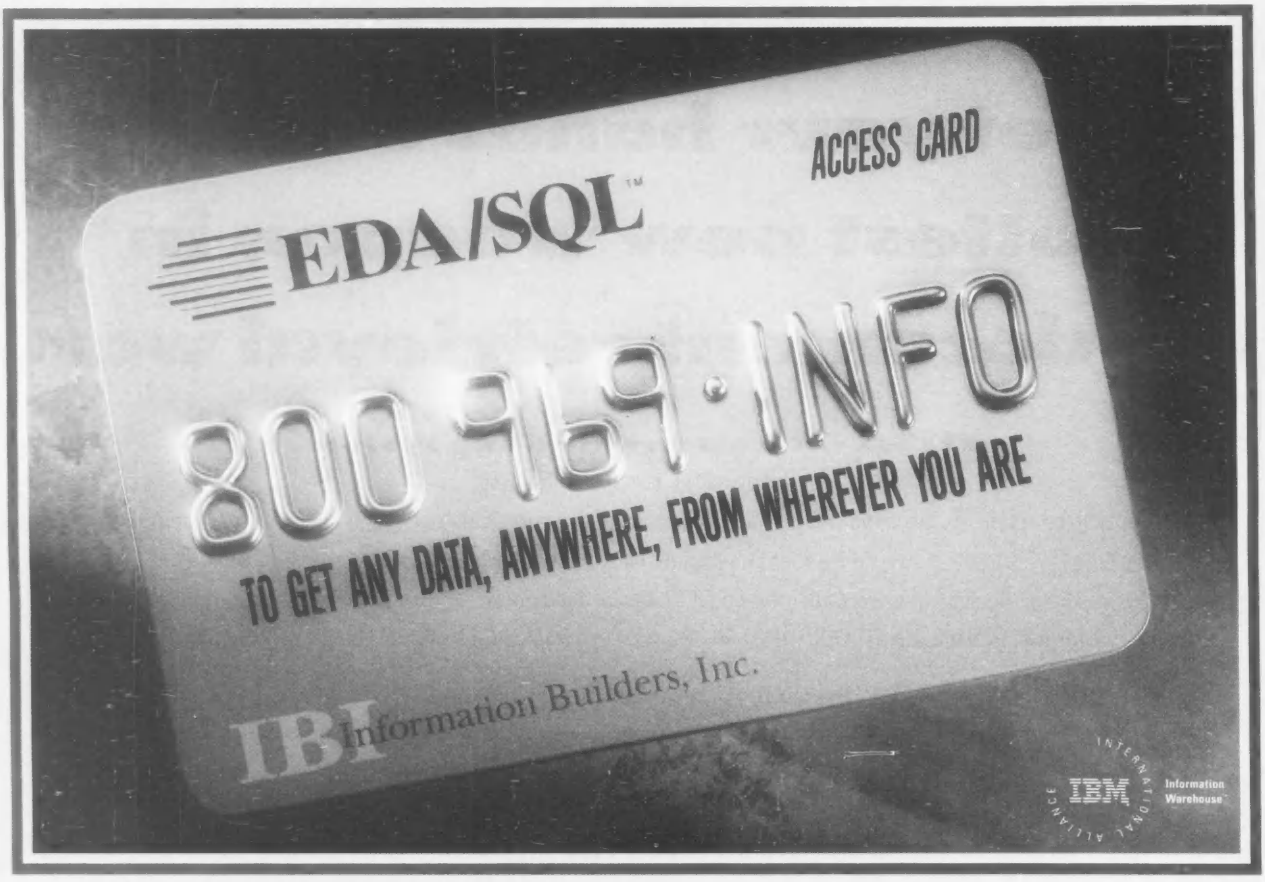

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IN BRIEF

Past crew forms firm

■ Former J. D. Edwards & Co. President Daniel J. Ellis has teamed up with other former executives of the Application System/400 software firm to form **Kapre Software, Inc.** in Boulder, Colo. The firm will focus on application development tools for Unix, some of which will be released next year, company officials said.

■ **Pioneer Software**, a Raleigh, N.C., purveyor of application development tools for executive information systems, will incorporate technology from Wilmington, Del.-based **MicroStrategy** into its forthcoming SQLToolKit.

MicroStrategy's HyperSQL, according to Pioneer officials, will allow SQLToolKit users to access information held in more than a dozen types of databases, including IBM's DB2, Oracle Corp.'s Oracle and Microsoft Corp.'s SQL Server.

■ Cambridge, Mass.-based **Integrated Computer Solutions, Inc.** has announced that its graphical user interface tools will support OSF/Motif 1.2, the latest release of the OSF/Motif environment.

■ **Visual Edge Software Ltd.**, a Montreal-based seller of graphical user interface development tools for OSF/Motif, has announced that five independent software vendors will use its UIM/X 2.0 to develop additional vertical market development tools.

■ **Easel Corp.** in Burlington, Mass., and **SHL Systemhouse, Inc.** in Ottowa, Canada, have entered into a marketing and technical support pact that will provide SHL Systemhouse programmers and consultants with specialized training and support using Easel's Easel Workbench development tool.

Client/server tester closes quality gap

BY GARRY RAY
CW STAFF

Developers of client/server applications can now join the software quality assurance movement with a new testing tool from Softbridge, Inc. in Cambridge, Mass.

The Softbridge tool, called Automated Test Facility (ATF), allows developers to test commercial or in-house client/server applications running under Microsoft Corp.'s Windows, MS-DOS and IBM's OS/2 in a networked environment.

Although there are currently a number of testing tools available for personal computer and networked applications, ATF fills a gap in the increasingly complex arena of client/server software, according to analysts, consultants and users.

All-purpose tool

"I don't know of any other tool that will go out and test the generic functions of a client/server program," said Ed Cain, principal of consulting firm Burlington Computer in Burlington, Mass.

"It's the only [testing tool] I know of that resides on a server and runs clients," said Bill Zumstein, chief scientist at the Oakbrook, Ill., consulting firm The Computer Power Group (CPG).

Because it can control up to 50 clients, ATF made it possible for Cain to test "hundreds of client configurations," by opening applications, servers and files "in a loop," he said. A scenario that includes hundreds of PCs is typical of the one developers face with increasingly complex client/server applications.

By definition, client/server applications run within heterogeneous hardware and software environments, typically including a mix of PCs and workstations running Windows, MS-DOS and OS/2.

Adding to the complexity are corporate applications that integrate internally developed software and off-the-shelf packages, often welded together with a scripting language, menuing system or high-level language such as Basic. Finally, these applications operate within one or more network environments and frequently access a number of servers.

With a mix of servers, it has become difficult for developers and software testers to track bugs, make fixes and thoroughly retest all elements of a client/server application.

"The number of permutations is infinite," said Pete Wilson, vice president at CPG.

ATF, which Wilson said is a type of "capture/playback" tool, will allow developers to more frequently test their applications. "What might otherwise take hours might take seconds. Without them, you'll make more decisions not to retest [applications]," he said.

Although Wilson said they are only one component of a larger testing methodology, capture/playback tools allow developers to repetitively replay a series of keystrokes or other operations, such as Windows movements, to test the integrity and functionality of an application.

Following the script

ATF and other capture/playback tools use intricate "scripts" to control client machines and have them perform defined operations, such as logging on to a database server and issuing a complex SQL command. ATF, Softbridge officials said, can simultaneously control up to 50 clients.

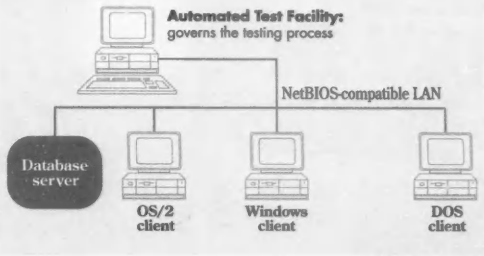
Other tests might include a complete exercise of all functions in a client application, including the use of all options in a multitiered menuing system. "We did everything possible in the [internally developed] system, which included 200 or 300 functions," said Lorene Hopkins, vice president of technology at Bankers Trust Co. in New York.

At each step of this process, the actual results of a test are compared with expected results.

"It's a cost-effective way of making a small group of testers a lot more effective," Hopkins said. However, she added that no testing tool is a panacea to a disorganized or nonexistent development program: "A disorganized team will still be disorganized with ATF."

One approach

Softbridge's Automated Test Facility puts client/server software through its paces by having one machine govern up to 50 others



CW Chart: Michael Siggins

Synon recasts strategy, looking beyond AS/400

BY KIM S. NASH
CW STAFF

LARKSPUR, Calif. — Recent strategic shifts at Synon Corp. should propel the Application System/400-oriented CASE vendor into nonmidrange markets and give users new tools for tweaking packaged applications.

Synon, which claimed $50 million in revenue for 1991, recently outlined the following three new directives:

• **Not just AS/400 anymore.** Branching out beyond its flagship AS/400-based computer-aided software engineering (CASE) products, Synon promised code generators for building programs to run on IBM's RISC System/6000 and Personal System/2 hardware lines.

On Synon's docket for mid-1993 are AIX and OS/2 code generators, to be priced between $30,000 and $50,000. The move is an acknowledgment that Synon needs to lessen its dependency on products tailored for IBM's AS/400 minicomputer systems, Synon President Chris Herron said.

"It's not that we're worried about the future of the platform . . . but we see other opportunities for growth," Herron said.

• **Third-party teams.** Several independent AS/400 software providers recently unveiled pacts with Synon to co-build tools designed to let users modify packaged programs. Synon signed deals recently with Marcam Corp., Software Artistry, Inc., Integral Systems, Inc. and Software 2000, Inc.

Users applauded the partnerships, saying they will increase the flexibility of packaged applications. "Off-the-shelf stuff isn't always the best fit, so now we'll be able to fix it," said Charles Greene, director of IS at Pace Foods, Inc.

The San Antonio-based food distributor has used Prism, an integrated financial and manufacturing application from Marcam, for three years.

Marcam and Synon signed an agreement to jointly develop a repository for storing data definitions and application logic specific to Marcam programs. The repository, not yet priced, is expected early next year, Herron said.

Users such as Pace Foods will be able to use Synon utilities to customize applications to accommodate quirky business rules, Herron said.

• **Gunning for Unisys.** Synon plans to step out of traditional CASE with a re-engineering product set aimed at converting Unisys Corp. programs to run on IBM's minicomputers.

Synon Gateway — due out this month and priced at $40,000 — is a combination software/services offering to convert programs built with Unisys' Linc fourth-generation language to the AS/400.

CASE companies have realized that users are unwilling to ignore legacy systems in which they have become heavily invested in over the years, said Andrew Mahon, senior research analyst at the Randolph, Mass., office of New Science Associates, Inc.

Existing mainframe-based applications are users' primary concern right now. "CASE is nice for new applications, but a lot of people have to deal with what they have right now," Mahon said.

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Fiction

SPACE ALIENS MARRY IN LAS VEGAS

LAS VEGAS, NEV. - Recently discovered aliens from planet X were married June 7, 1992. The bride and groom both wore green. The aliens drew a large crowd of well wishers for the festive occasion. The newlyweds will honeymoon in H

Fact

HAYES OPTIMA PANICS COMPETITION

by Gary Lancaster

The tremendously successful OPTIMA family, the best received product in Hayes' history, is expanding further. With the introduction of OPTIMA+FAX, Hayes has other modem makers running for cover. Hayes not only pioneered the modem industry, the company's reputation for quality and dependability is still unchallenged.

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COMMENTARY

Patricia Seymour

Salvaging systems

As "Keep on redeveloping," [CW, April 27] by Judith S. Hurwitz advocated, new application development should be written with "perpetual redevelopment" in mind. That is, applications should be constructed "out of small modules rather than integrated programs."

But can we also effect the same type of "modularization" of existing systems by extracting the valuable code that represents the business functions of old programs and retroactively begin to redevelop for "perpetual redevelopment?"

At Pacific Bell, where I founded and managed the Systems Renewal Group, we were successful in persuading Phoenix-based Viasoft Corp. to develop and market a product that empowered our staff to automatically isolate, extract and reuse code from existing Cobol systems, without risk to the original program. A benchmark for the product, which we beta-tested, was to attempt to "slice" a 25,000-line program into small, functional modules. The same code had already been manually split by one of our programmers in one week; the new product did it in about 10 minutes.

A horizontal strategy

As I watched what was happening at Pac Bell and other companies, I realized that "re-engineering" was positioned incorrectly. Rather than a goal in itself, it is an enabling technology for transitioning systems to target environments driven not by tools but by business demands. From this idea, I developed a "software Asset Management Framework," for the purpose of showing that re-engineering existing systems is a horizontal, not a vertical, strategy. This framework illustrates that the degree to which systems are re-engineered is directly proportional to the business demand and return on investment.

A big mistake in the infancy of re-engineering was the belief that all systems should be re-engineered. Proceeding without a sound redevelopment methodology, some organizations spent thousands of dollars and considerable time only to be disappointed when expected productivity benefits never materialized. I often saw systems solutions created before adequate problem analysis was completed — in some cases before problem analysis even began.

For example, software packages were often purchased and never used because organizations were unable to decompose the system and map the existing functionality to that of the package. Thus, they could not enhance that functionality.

Do your homework

My framework emphasizes doing the proper analysis up front. Organizations need to develop means to understand and assess problems in their existing systems at the lowest level before choosing a solution. They can then provide themselves with powerful tools for isolating, extracting and reusing the functions of current systems.

The process I advocate applies the same "perpetual redevelopment" philosophy of Hurwitz, only it modularizes systems that have already been created.

In fact, Hurwitz's closing argument for perpetual redevelopment can be paraphrased to fit redevelopment of existing systems: "Pick a new [existing] project and design [redevelop] it with perpetual redevelopment as the goal." I would add that for redevelopment of existing systems, a process of understanding and assessment is an absolute requirement for success.

Seymour worked at Pacific Bell in San Ramon, Calif., for 20 years. She is now principal at Technology Innovations, a Danville, Calif., firm specializing in systems redevelopment.

CASE company in UK crumbles

BY RON CONDON
IDG NEWS SERVICE

LONDON — An ambitious plan to build a computer-aided software engineering (CASE) tool that covers all stages of development from original concept to finished system has crashed, owing approximately $9 million.

Information Architechs was formed two years ago by British Gas to market and develop a CASE system that had been written originally for in-house use. But after extensive marketing, the company had managed to find only two customers outside British Gas.

It had set a goal of winning 20% of the CASE market by 1995, but by March 1991, it had losses of $2.9 million. This year's losses, including the cost of closing the firm, will be around $8.7 million, according to British Gas.

Despite the arrival of new management this year, the company's Architech product had won only Mercantile & General and Clackmannan District Council in Scotland as its non-British Gas customers.

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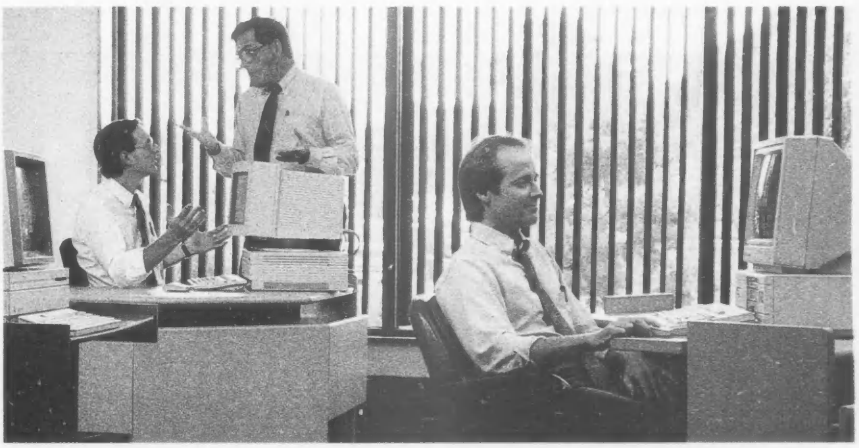

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Unix/Motif porting eased

BY GARRY RAY
CW STAFF

A new porting tool announced at last week's Xhibition in San Jose, Calif., will make it easier to move Microsoft Corp.'s Windows applications to Unix/Motif platforms.

Called Wind/U, the $50,000 tool from Bristol Technology, Inc. in Ridgefield, Conn., is said to eliminate many of the hand-coding issues that developers traditionally face in moving their applications from one platform to another.

According to Ken Blackwell, Bristol's chief technical officer, Wind/U translates Windows source code, including all calls to the Windows application programming interface (API), to equivalent calls in the Unix/Motif environment.

Windows source code is placed on a Unix workstation running Wind/U and recompiled.

During the compilation stage, Windows-specific functions are replaced with equivalent Unix/Motif, X Windows and Unix functions, a spokesman said.

The result, according to Mo Bjornestad, vice president of sales at Mark V Systems in Encino, Calif., is a significant reduction in porting time and development staff.

"It's like I get a bonus of two people, which is more than 10% of my development staff," he said.

Satisfied user

Mark V Systems recently completed a port of its ObjectMaker computer-aided software engineering (CASE) application to the Sun Microsystems, Inc. SPARCstation using Wind/U.

According to Bjornestad, Mark V Systems' CASE program is a "very demanding" test of Wind/U's capabilities.

"As a new architecture comes out, we break up their compilers and their windows, so we were a good acid test" for the porting tool, he said.

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NEW PRODUCTS

Database management systems

Compuware Corp. has released TransRelate Workbench for DB2 Release 2.1.

This release offers new utility management capabilities, expanded catalog analysis, reporting features, enhanced migration facilities and support for DB2 Release 2.3.

Users can analyze DB2 catalogs and create and modify DB2 objects without writing SQL, the company reported.

DB2 utility management and DB2 security administration capabilities are provided in the Workbench, and the product automatically generates procedures that handle referential integrity, authorizations, utilities, data and plans.

TransRelate Workbench for DB2 Release 2.1 starts at $49,000.

Compuware
31440 Northwestern Highway
Farmington Hills, Mich. 48333
(313) 737-7300

Development tools

National Information Systems, Inc. has announced Accent RDM Version 4.4A, an applications generator and report writing product.

Accent RDM Version 4.4A features include support for The Santa Cruz Operation's Unix, capability for expanded screen form development and report writing, additions to the procedural fourth-generation language and optimized I/O and execution of language routines.

More business rules, procedures and goals within the application are possible, the company reported.

Accent RDM costs $895 for development licenses on MS-DOS and OS/2.

The DOS local-area network version starts at $1,495, and licenses for Digital Equipment Corp. VAXs and MicroVAXes running VMS range from $2,000 to $77,000.

National Information Systems
Suite 200
4040 Moorpark Ave.
San Jose, Calif. 95117
(408) 985-7100

Syscorp International has announced MicroStep V1.6 and MicroStep QS, programming tools for creating personal computer applications.

Users can develop stand-alone or multiuser client/server applications without having to manually create code manually.

MicroStep QS allows users to make database applications for day-to-day business needs and custom applications that integrate with Btrieve and Novell, Inc.'s NetWare SQL-compatible products, the company reported.

MicroStep V1.6's SQL compatiblity package can share data with Btrieve-compatible application packages and optimize the performance benefits of extended memory.

MicroStep QS costs $895, and MicroStep V1.6 costs $1,895.

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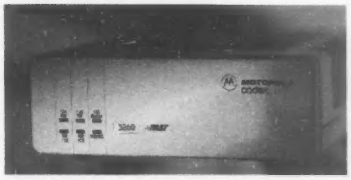

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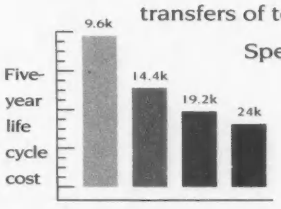

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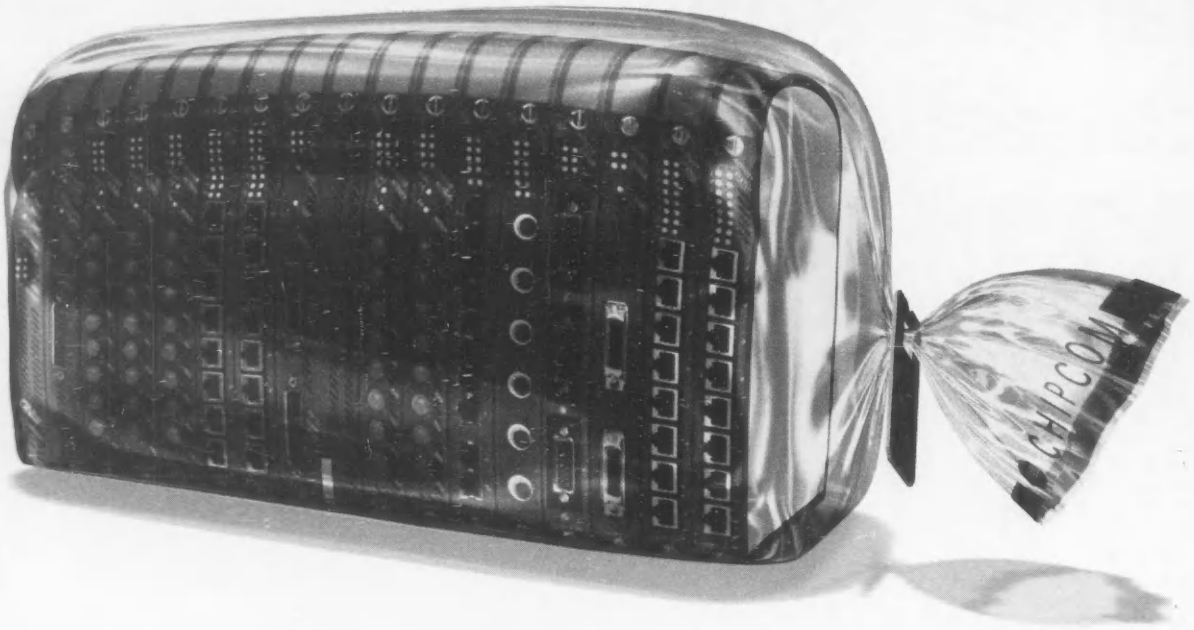

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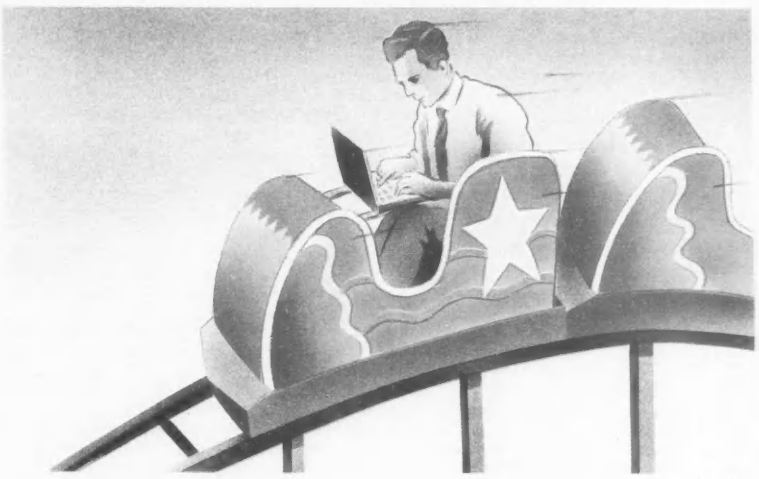
Notebook computers

With the new crop of notebook computers, you can compute 'anything, anywhere.' But there are still some ups and downs to it.



Stuart Siegel

BY CHERYL GOLDBERG

A day doesn't pass, it seems, that you don't hear of an advancement in notebook computers, from the essential to the innovative to the inevitable. Consider the manufacturer that just announced it will shed pounds by using plastics rather than metal in its LCD casing or the vendor that developed a hinge mechanism that makes its notebook easier to use on an airplane.

But do these and other advancements represent giant steps toward "anything, anywhere" computing — the goal that most users are trying to achieve? Or are they merely incremental changes made in hopes of appeasing users who, for instance, still can't buy a notebook computer with a color Video Graphics Array (VGA) display without paying an arm and a leg and lugging around a couple of pounds of extra batteries?

According to the people who really count — the users themselves — this year's crop of notebook computers does come closer than ever to obliterating historical notebook annoyances — such as squint-inducing screens, skimpy hard disks and long recharge times. There are even some very good keyboards available.

"The technology has finally reached the point where you can run standard business applications in a standard lightweight machine," says Matt Cain, senior research analyst at Meta Group, Inc. in Westport, Conn.

There are plenty of 5- to 7-pound machines out there, available in the low $3,000 range that use the Intel Corp. 80386SX chip or derivatives, which is what most people are buying. But that doesn't mean you can overlook the sticking points, which include problems running robust operating systems, short battery life and still-high price differentials with desktop machines.

To get an idea of how these machines work in action, *Computerworld* spoke with people who use notebooks sporting the 80386 and the 68030 from Motorola, Inc. Their machines — Apple Computer, Inc.'s PowerBook 170; Grid Systems Corp.'s 1755; Beaver Computer Corp.'s Avanti Model 025; Compaq Computer Corp.'s LTE Lite/25; NEC Corp.'s UltraLite SL/25C; and NCR Corp.'s Safari NSX20 — represent a range of state-of-the-art capabilities.

For example, the PowerBook uses active-matrix monochrome, while NEC's UltraLite has an active-matrix color LCD screen. NCR's Safari features built-in communications software and a cellular-capable fax modem. The Compaq uses Intel's power-conserving 386SL/25 chip, and the Beaver Computer system uses Advanced Micro Devices, Inc. (AMD) competing AM386SXL chip. Here's what we found:

Hard disks • *No complaints, with capacities of 120M bytes and seek times of 20 msec. available.*

Just one year ago, the largest hard disk to be had on a notebook was 40M bytes. This was a major constraint for anyone wishing to use the same applications that ran on their 80M- or 100M-byte and higher desktop machines.

This year's releases have gained considerably in hard disk size, with capacities as large as 120M bytes.

Furthermore, with hard disks boasting seek times of less than 20 msec, users aren't complaining about speed either.

"It boots Windows quickly and performs operations quickly," says Alicia Blanchard, marketing coordinator at NView Corp., a maker of color LCD project panels in Newport News, Va. Blanchard uses the UltraLite with an 80M-byte hard drive.

Displays • *Overall satisfaction, although you should ensure that the screen can be read at an angle. Running Windows can cause cursor problems.*

One of the biggest disappointments of early notebooks was their abysmal displays. In the past year or so, however, the monochrome VGA displays improved substantially, and today's 386-based notebooks typically come with black-and-white triple supertwist backlit LCD displays with 640- by 480-pixel VGA resolution, a 20:1 or so contrast ratio and 32 shades of grey. The best displays have also grown from 9-in. diagonal to 10-in.

You also have the choice of active-matrix screens, which are easier to view at an angle but typically come with a $1,000 premium.

The best screens are highly readable in adverse conditions. On the PowerBook 170, "I can put it in direct sunlight, and the clarity and contrast is excel-

Continued on page 112

Goldberg is a free-lance writer based in San Francisco.

INSIDE

But Can It Run OS/2? This robust operating system makes great demands. Page 118.

Buyer's Scorecard PowerBook tops user ratings of notebook computers. Page 129.

Product Guide 386-based notebooks less than 6.5 pounds and under $2,500. Page 122.

Ups and downs of notebook computers

CONTINUED FROM PAGE 111

lent," says Sandy Kaufman, director of public sector health policy at Cannaught Laboratories, Inc. in Swiftwater, Pa.

Just as important, "If I'm sitting with someone and showing them numbers on my [Grid 1775 display] screen, we can both look at it together," says Bill Hayhurst, assistant vice president of Mechanization Strategies at Aetna Life and Casualty Co. in Hartford, Conn. However, Microsoft Corp. Windows applications can cause trouble. Moving the mouse too quickly can cause the cursor to disappear on LCD screens — an effect known as submarining. Submarining does not occur on active-matrix displays.

Where mainstream notebook displays really fall short is in color, which commands up to $2,000 for the highest quality active-matrix LCD displays and $1,000 for the washed-out-looking passive matrix LCD color displays.

"Only about 10% of the overall market might need color, say, to make presentations to clients in their office," says Jeremiah Caron, senior group editor at Falkner Information Services, Inc. in Pennsauken, N.J. At this point, most users are pleased enough with the greyscale quality on the monochrome screens, anyway, even for Windows.

Keyboards and input devices

▪ *Keyboards, still nonstandard, take some getting used to. Mouselike pointing devices, such as trackballs, get the big thumbs-down.*

For all their improvements, keyboards continue to be a sticking point for notebook users. The standard 101-key keyboard is generally shrunk to about 80 keys by doubling up some of the key functions. Cursor keys and PgUp, PgDn, Home and End keys are also repositioned.

While many keyboards now boast relatively intelligent designs, "Some still have lousy layouts," says Bill Lempesis, president of Lempesis Research in Pleasanton, Calif. The best keyboards offer separate cursor keys in an inverted "T" design, dedicated function keys and a quiet, tactile feel. Some machines, such as the IBM L40SX, use full travel (meaning that they can be depressed 3mm) vs. short travel (1mm to 3mm movement). The advantage is that these keys duplicate the feel of a desktop keyboard.

Most of the users interviewed were happy with their keyboard, although many said it took some getting used to. "The arrow keys are laid down in an 'L.' Also, the PgUp, PgDn, Home and End keys use the function keys," says William Scribner, vice president of AG Andrikopoulos Resources, Inc. in Cheyenne, Wyo., who uses the Avanti Model 025. "It took a few minutes to get used to," he says.

Users were less favorable about the scaled-down mouse-type "pointing" devices designed for use in cramped quarters. Most machines come with a mouse port to which you can attach a standard mouse, but for mobile use, many vendors also offer trackballs, clip-on mice, scroll bars or special "J" keys that require you to press down the key and shift your finger weight to one direction or another to move the cursor.

These mouselike devices are not being favorably received. "No one has come up with a totally satisfactory way to do the pointing," Hayhurst concurs. "With a mouse, you move it three inches and the cursor moves three inches. A trackball is not as natural."

So far, users are happiest with the PowerBook-like design, in which the built-in trackball is placed in the center of the machine below the space bar, where it is easy to reach with your thumb.

Batteries • *Ouch. Most machines still use technology that offers only two hours of life, maximum. Wait until next year for improvements here. Shorter recharge times are a glimmer of good news.*

Battery technology saw little improvement in the past year. Most notebooks still use nickel cadmium batteries, which generally last about two hours under normal use.

Toshiba America Information Systems, Inc. has pushed the threshold of battery technology as the first major vendor to use nickel metal hydride batteries. Although they currently cost more, the longer life and lack of toxicity in nickel hydride batteries makes them more attractive than nickel cadmium.

Changing the batteries, which usually weigh about 1 pound, simply requires opening the battery cover and replacing them. Some machines, such as the Grid, include a bridge battery that gives you enough time to change the battery without powering down.

There is good news on the recharging front. Faster rechargers can complete the job in about 60 minutes, and some recharge as you work. However, some vendors still require you to periodically drain the battery.

"Once a month, you're supposed to drain the PowerBook's batteries and then recharge. That's a pain in the neck," Kaufman says.

Power management • *Lots of action here. What's really handy is the ability to put the machine to sleep and otherwise control how much power is being consumed by fax modems, ports, etc.*

New chips have brought power management to notebooks, and component parts are beginning to emerge that run on 3.3V rather than the now standard 5V.

The Intel 386SL and AMD AM386SXL include two modes that prolong battery life. In standby mode, when no activity occurs for two to three minutes, the display darkens, the hard disk stops spinning, and power to the floppy drive is cut. Rest mode occurs if the computer detects no activity for approximately 10 minutes. The computer draws just enough power to maintain a state of suspended animation in which it can preserve data on your screen for up to two weeks.

With these power management features, some batteries are able to last as long as three to four hours.

What's really nice is the ability to control these power-saving features. On the Avanti Model 025, "The menu has a sleep mode that you can adjust to make the hard disk and display 'go to sleep' after user-defined intervals," says Tom Payton, systems analyst at Great Plains Health Service, Inc. in Lubbock, Texas, who uses the Avanti Model 025. In addition to this, he says, you can decrease the megahertz level on the CPU if it's not being used, as well as turn off the fax modem, parallel and serial ports to conserve power. Payton says he has gained more than two hours of use without the warning light coming on.

The PowerBook lets you put the machine to sleep simply by clicking a "Sleep" icon.

Most notebooks do a good job of warning you when they're about to run out of juice. The Avanti gives you three alerts. First, a warning light comes on when the battery is down to 10% of its power. When you have a minute or two left, the light starts to blink. A third alarm tells you that the machine is ready to shut itself down; then the Avanti suspends animation so you don't lose the file.

.....

And so the trade-offs continue. It is widely believed that the next two years will bring much more dramatic improvements in battery power, weight and even price. However, these developments will be incremental over the next few years, not months.

Pricing on 386SX-based machines will not take so long. Lempesis says he expects the price differential to narrow rapidly, with "a lot of [notebooks] under $2,000 by the end of the year."

Meanwhile, notebook sales are not hampered as users willingly put up with the continuing drawbacks. The best you can do is kick the tires of a machine to get the best of all worlds — and negotiate a good price. •

Better and best

The ante has been upped on notebook state of the art

	Standard	Above and beyond
Price	$2,000 to $4,000	$1,300
Weight	5 to 7 pounds	4.5 pounds
RAM	2M to 4M bytes	10M bytes, processor RAM cache
Display	Triple supertwist LCD, 9-in. diagonal	Color active matrix LCD, 10-in. diagonal
Battery	2 to 3 hours	3 to 4 hours
Keyboard	80 keys	Inverted 'T' design; dedicated function keys
Modem	Fax modem, 4.8K bit/sec.	Cellular modem, 9.6K bit/sec.
Ports	Parallel/serial/mouse	LAN adapter
Expansion slots	Memory/modem	PCMCIA cards

Pass the chips

"Betcha can't eat just one" seems to be the motto among chip vendors, which are churning out variation after variation of processors. The new features are intended to — what else? — do more with less weight and increase battery life along the way. Chips, anyone?

• **Intel Corp.**

80386SX *(16 MHz, 20 MHz and 25 MHz)*: A low-power version of the chip Intel uses on desktop computers. This chip provides a breakthrough for the notebook market, making notebook computers powerful enough to run most popular desktop software.

80386SL *(20 MHz, 25 MHz)*: A chip designed with power management in mind. The SL contains integrated memory controllers and I/O controllers, which allow for more compact design of the motherboard. It also has special power management commands built into its microcode.

(Note: Intel's more powerful 33-MHz 386DX, I486SX and I486DX chips also appear in notebook systems.)

• **Advanced Micro Devices, Inc.**

AM386SXL *(25 MHz)*: This is AMD's clone of the Intel 386SX chip. Until Intel recently boosted its own 386SX, AMD offered faster performance at a lower price.

AM386SXLV: The first low-volt processor. Normal processors run at 5V, whereas the SXLV runs at 3.3V, which helps it generate extra battery life in properly configured systems. These will not be available until the end of the year.

(Note: AMD also offers the AM386DXL/25 and 386DXLV, 32-bit clones of Intel's 386DX. In addition, Intel recently released 3.3V versions of the 386SL and will ship a 486SL by year's end.)

• **IBM**

386SLC *(used only in IBM products)*: A derivative of the 386SX, IBM's SLC has some integrated features, including an on-board cache that gives it the performance of a high-level 386DX chip.

• **Cyrix Corp.**

CX486SLC: A brand new "hybrid" chip that appears in notebooks from several vendors. The 486SLC mimics 486SX microcode and features, but it is contained in a 386SX-compatible package. Cyrix priced the chip to undercut the 486SX, aiming at easy power boosts by vendors.

• **Chips and Technologies, Inc.**

Super 386: An Intel imitator with extensive features integrated on it. Has not scored any major design wins.

MICHAEL FITZGERALD

No portable is an island

One of the biggest ways that notebooks have changed (and will continue to change) is in their ability to communicate with other computers in the home office. So far, they have a ways to go before they perfect the job.

Currently, NCR's Safari is the prototypical communications-ready notebook. It is sold bundled with a cellular-capable fax modem and electronic-mail software built-in.

Other machines that are beginning to incorporate networking include Apple's PowerBook and Zenith Data Systems' Z-Note. The PowerBook has a built-in AppleTalk network port, and the new Zenith Data line comes with a built-in high-speed communications port that can connect to an Ethernet local-area network. It also comes with user shells installed and configured for Microsoft's LAN Manager, Novell, Inc. NetWare or Banyan Systems, Inc. Vines.

Modems rising high

As for the majority of machines being sold today, most have optional built-in data and fax modems, with speeds of up to 9.6K bit/sec. Cellular modems, which allow you to call into the office from any location without having to hunt for a phone jack, are also beginning to emerge, with the Safari taking a lead role. But cellular technology still needs to become more reliable and cost-effective before it becomes widely adopted.

Modems work well when you're away from the office, but when users need to transfer files with their personal computers, they are most apt to exchange files via a floppy disk. This job is fairly straightforward because most notebooks come standard with the same 1.44M-byte, 3½-in. drives that are on desktop machines.

That's fine for people with two machines, but what if you have only a notebook computer and need to tie into the LAN? That's a problem for many notebooks; while most include at least a serial and a parallel port, an external CRT, a keyboard connector and a mouse port, few include a slot for a LAN adapter.

Instead, some people turn to expansion stations. These devices also allow the notebook to connect with tape drives, additional hard disks, full-size keyboards and color monitors. The better expansion stations let you leave all the peripherals plugged in, allowing you to just slide the notebook in and out.

Although pricing on expansion stations is high at about $1,000, users say the price is justifiable because they can use just one machine. So far, however, docking stations haven't caught on in a big way. One reason is that many notebook computer users already have desktop machines.

Another problem is that the technology is not entirely mature. "Compaq is on their second generation of [expansion] stations, and they don't work with the older model notebooks. If there are different versions, it could be a real mess," says Bill Hayhurst, assistant vice president of mechanization strategies at Aetna Life and Casualty Co. in Hartford, Conn.

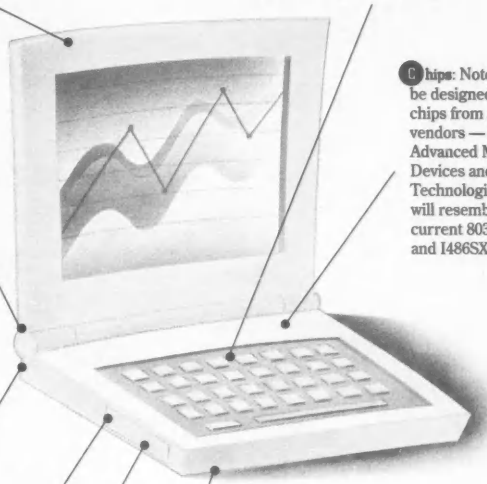
CHERYL GOLDBERG

Notebooks 1994

Displays: Passive matrix color VGA displays will be the most common. Active matrix color will still be too expensive and power hungry, and it is not battery-friendly. Because of notebooks' small screen size, VGA is a high enough resolution level for most people. Super VGA is too excessive for these products.

Keyboard/Other input: Keyboards will continue to dominate; however, they will increasingly sport full-travel keys, which move more than 3mm when depressed. Trackballs and other integrated pointing devices will become standard. Pen input will be increasingly used but will continue to be limited.

Memory: In order to run larger operating systems and applications software packages, 4M bytes of RAM will be the de facto minimum for notebooks.



Chips: Notebooks will be designed around chips from a variety of vendors — including Advanced Micro Devices and Chips and Technologies. These will resemble Intel's current 80386SX, 386SL and I486SX products.

Batteries/Power consumption: Improvements in power management — including reductions in power consumption, reduced operating voltage and improved battery design — will make it possible to manufacture smaller notebooks with an increased number of features and better battery life. Developments in lithium and hydride batteries will permit this growth. Gates Energy Products in Gainesville, Fla., is making headway in this direction.

All notebooks will be standardized at 3V, as opposed to today's standard 5V. This, when combined with the elimination of disk drives and new battery technologies, will permit four to eight hours of battery life.

Weight: Because of the other advances, notebook weight will be reduced to under 6 pounds.

Communications: Most notebooks will feature wireless fax/modems with rates of 9.6K bit/sec. Voice processing isn't likely because chip sets are too large and expensive.

Disk storage: Memory electronics will rely almost exclusively on solid-state technology. CD-ROM drives will be prevalent, but only externally. Card drives from PCMCIA will be used in lieu of either a hard drive or floppy disk drive. A SCSI port will be standard so these devices can be attached externally. When spinning hard drives are eliminated, both power consumption and product weight will be significantly reduced.

Marc Regberg, Venture Development Corp., Natick, Mass.

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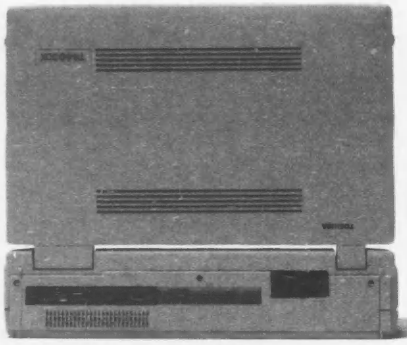
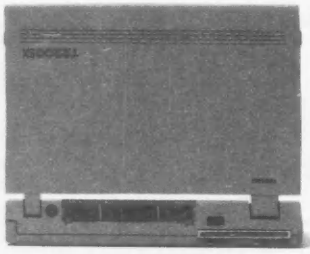


T6400DX

(Although our spec sheets do make excellent reading.)



T2200SX

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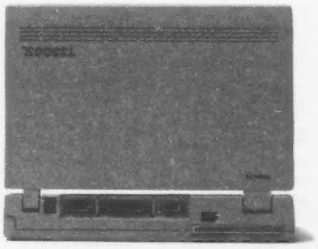

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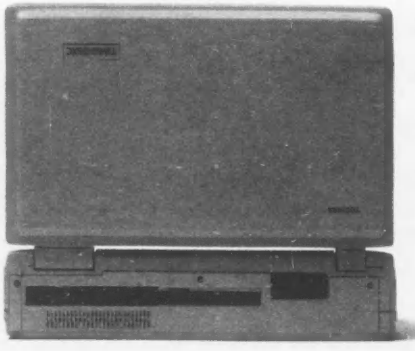
T6400SXC



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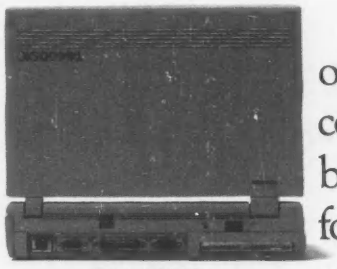

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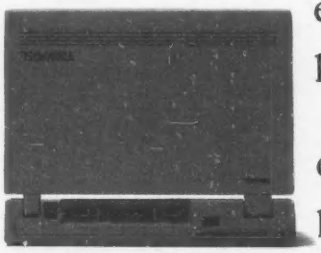

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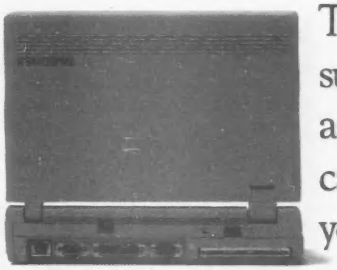

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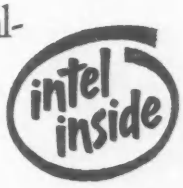
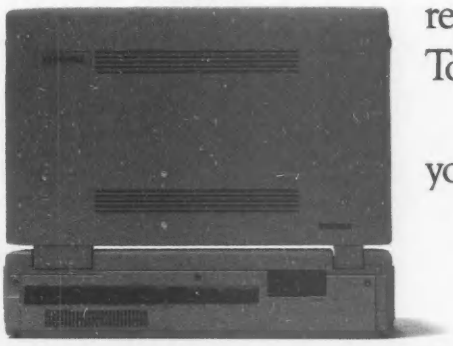


Which, after everything we've told you, does seem like the logical next step.

T6400SX



In Touch with Tomorrow

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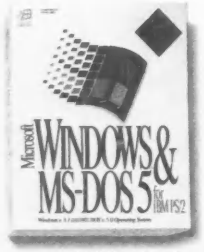
Application	Test*	PS/2 56/57 w/ 4MB RAM w/ Windows 3.1 & MS-DOS 5	Standard configuration PS/2 56/57 w/ 4MB RAM w/ OS/2 2.0	Times Faster
		Time in seconds	Time in seconds	
Microsoft Excel 4.0 for Windows	File Load	7.3	53.8	7.4
Lotus® 1-2-3® for Windows	Application Load	21.5	134.8	6.3
Ami Pro™ 2.0 for Windows	Print	18.0	110.0	6.1
WordPerfect® 5.1 for Windows	Spellcheck	12.7	26.4	2.1



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Sometimes, you've got to take service matters into your own hands

BY ALAN RADDING

Maybe it's because they absorb more than their fair share of bumps and bruises. Maybe it's because vendors try to crowd lots of technology into a small space at a low price. Whatever the reason, portable computers seem to generate some quirky problems, made all the more exasperating because quite often, the dealer's or vendor's idea of support is to replace the entire system. That's why many users choose to fix the problems themselves. Here are some examples of how users solved their own problems or, when necessary, stoically accepted the fact that their machines aren't perfect.

Thanks for the memory troubles

How would you like to reboot your system every time you ran your most common application? That's what Dick Moffat, a London, Ontario-based independent consultant had to do to get rid of the parity error that occurred almost every time he exited his DOS version of Lotus Development Corp.'s 1-2-3 under Microsoft Windows on his Toshiba 5100. Considering that he specialized in Lotus and Excel applications, Moffat says he found the problem annoying.

Dick Moffat
Independent consultant
London, Ontario

"I attribute the problem to hauling the machine around so much. Things just shake loose."

The first time he called Toshiba, "I got very frustrated and fed up," he recalls. Resigned to living with the situation, Moffat "limped along," rebooting as necessary.

After a year and a half, he tried Toshiba again. By then, the technical support staff had the answer in its database: It was an extended memory configuration problem, and the technical support person walked him through the solution.

Unfortunately, the memory problems didn't end there. No sooner had Moffat stopped the parity errors than he found his system indiscriminately rebooting, only stopping when he turned off the machine.

This time Moffat took the machine to his local dealer, which held on to it for a week before determining that there was nothing to do but replace the entire motherboard. Unsatisfied with that solution, Moffat then took the machine to a "hardware techie friend," who opened the case — "something not for the faint of heart" — and popped out all the memory modules and reseated them. While he was at it, he reseated every chip in the machine. The system has worked fine ever since. "I attribute the problem to hauling the machine around so much," Moffat concludes. "Things just shake loose."

'It's not our problem'

Oh, those famous words that no user wants to hear. But hear them he did, says Albert Goldman, a former consulting engineer in Newton, Mass.

The trouble started when he found he couldn't turn off the numeric keys of his Everex Systems, Inc. 386 laptop. On the compact laptop keyboard, the numeric keys are not grouped separately in a number pad of their own but are doubled up with the regular keys and activated through the keyboard.

"If the numeric keys are used with an application I was working on, the application would blow up," he says.

Goldman wrote to Everex for help. "They finally responded by telling me that it was somebody else's problem," he says.

After a long investigation, Goldman finally traced the problem to the AUTOEXEC.BAT file. Using Professional Write, a word processor that lets him work in a straight ASCII format, he was able to pull the file onto the screen, identify the problem code and correct it.

It was a happy ending, thanks to Goldman's pioneering spirit.

Printer puzzles

And then there are laptops that defy logic. Peter Moseley's Tandon Corp. machine will print without a problem to one of his company's Hewlett-Packard Co. LaserJet III printers but not to another identical printer.

"I took it back to the store, and they suggested that I replace the motherboard," says Moseley, treasurer at Harbourton Enterprises, a mortgage banking firm in Princeton, N.J.

Moseley wasn't convinced that the problem was the motherboard, so he wasn't inclined to replace it. He also couldn't afford to be without his computer for the length of time Tandon would have taken to fix it. "They won't let anyone else work on it," he says. "You have to send it back to them and wait."

Instead, he developed several work-arounds to the printer problem. He can use the printer that his machine *does* work with, download the data to a disk and take it to a machine that works with either printer. Or he can transmit the data by modem to another company location, where it will be printed for him. Sometimes, he has learned, you just live with the irrational.

Disk woes

There are some problems for which you must accept responsibility. Inserting a floppy disk the wrong way falls into that category. But Joseph Reagan Jr., a project manager at Ballinger Co., a Philadelphia architectural and engineering firm, says there are other problems with his Magnavox 286 portable computer for which he's not to blame.

"I had always used a personal computer on a network, so I never had to put a disk in the disk drive," Reagan says. Alone in a hotel room after a meeting, he stuck the 3½-in. diskette into the disk drive upside down and backward, gave a little push, and something snapped.

Although that rendered the floppy drive useless, Reagan was able to continue booting and operating the system off the hard disk.

When he got back to Philadelphia, Reagan sheepishly returned the week-old machine to the consumer electronics retailer that sold it to him and hoped the warranty still applied. It did, and the dealer replaced his machine with a new one.

Joseph Reagan Jr.
Project manager
Ballinger Co.

Now that he's on his second replacement machine, "the best solution is probably to buy a more expensive machine in the first place."

Not much time passed when Reagan discovered a problem with this new machine: It could read files, but it wasn't able to write them. When he was out on the road again, Reagan found himself transferring files back to the home office over the modem in order to save them.

Once again, he returned the machine to the dealer, which put in an order for a replacement drive. Several weeks later, with no replacement drive in sight, the dealer replaced the entire machine for a second time.

"The best solution is probably to buy a more expensive machine in the first place," but his budget was a serious constraint, Reagan says. Thanks to the warranty and an obliging dealer, however, he can keep on typing.

Radding is a free-lance writer based in Newton, Mass.

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Not every notebook is up to the rigors of OS/2

Look beyond vendor claims to see if performance, storage, displays are really up to the task

BY FABIAN PASCAL

If you are hoping to run OS/2 on a notebook computer, you'll have to be careful in your selection. Only a few machines that fall in the true notebook category — weighing under 6½ pounds, measuring 8 by 11½ by 2 in. or less and costing less than $2,500 — have the necessary features to run this truly multitasking, "run everything" operating system — and run it well.

Even when a notebook supports certain OS/2-sensitive features, information about those features is not always readily accessible and can be tedious to obtain. Here are some specific guidelines for choosing a notebook to run OS/2, based on a preliminary survey of several notebook products:

Compatibility. Theoretically, OS/2 should run on any IBM-compatible notebook, but in practice, there are some quirks. Very few vendors have licensed OS/2 (or plan to in the future), and most do not even bother to test it. As a buyer, you should thoroughly test IBM's OS/2 on any machine prior to purchase or get a refund assurance from the vendor.

CPU. Speeding up performance is critical for OS/2, so anything less than 386SX/25 MHz is inadvisable. OS/2 can be more resource-demanding than DOS and Microsoft Corp.'s Windows, so the more efficient power management of the SL, SXL and SLC versions of the 386 processor are also preferable.

386DX and 486 units are increasingly becoming available but aren't always practical, as they tend to be heavier, shorter on battery life, prone to heating and more expensive.

Ensuring upgradability would be nice, but no vendor offers that assurance. CPU cache, which is also recommended (the bigger the better), varies from zero to 8K, 16K, 32K and up to 64K bytes, such as on **Toshiba America Information Systems, Inc.**'s 3300SL, **Aquiline, Inc.**'s Arima 386/SL and **Grid Systems Corp.**'s 1660/25.

Bus. OS/2 2.0 is a 32-bit operating system, so only a bus with a 32-bit data path would fully exploit it, particularly in terms of peripheral performance. This means either Extended Industry Standard Architecture or Micro Channel Architecture (MCA), but current users must accept 16-bit paths. **IBM**'s MCA notebooks, the Personal System/2 Models N51SLC and N51SX, have 16-bit path MCA buses.

Memory. OS/2 will install and run on as little as 4M bytes of random-access memory but is bound to be slow, with lots of disk swapping. For reasonable performance with multiple applications, including caching slack, a minimum of 8M bytes — and preferably 12M bytes — is necessary.

Most notebooks come standard with only 2M bytes of base RAM (4M bytes on **Zenith Data Systems'** Z-Note and the Slimnotes), expandable to a maximum of 8M bytes. Toshiba's 3300SL expands to 16M bytes and Aquiline's Arima to 10M bytes. There are also some 20M-byte machines.

Memory is usually proprietary and expensive, so users should consider starting with as little as is workable, gradually expanding as necessary. But some vendors (such as IBM) commit you up front to certain module sizes, which you must substitute with larger ones to upgrade. OS/2 will benefit from faster memory, so RAM should not be slower than 70 nsec. IBM and Aquiline offer 80-nsec RAM.

Storage. Although the hard disk space needed for OS/2 can be reduced from the maximum 30M bytes by not installing optional features, the size of files will quickly reach the limit of even 80M-byte drives. Some machines come with only 60M bytes, and the preferable 120M bytes is usually an expensive option. Exceptions are Zenith Data and **Twinhead Corp.**, which offer 120M bytes standard, and Grid, with 125M bytes.

Disk backup is not a satisfactory proposition for OS/2. Therefore, an external backup device (such as tape, cartridge or a second hard disk) is usually necessary through expansion features such as an expansion station (**Compaq Computer Corp.** offers external tape drives for its LTE Lite/25) or parallel port devices, such as **Iomega Corp.**'s Bernoulli Box.

A Small Computer Systems Interface (SCSI) would come in handy but is rarely available, although **Trantor Systems Ltd.** offers the T348 adapter, which allows the notebook to control an external SCSI device.

Displays. Even with a 9½- or 10-in. diagonal screen, notebooks can't take useful advantage of resolutions higher than IBM Video Graphics Array (VGA), which is recommended for the Work Place Shell. Color is preferable, but it is expensive.

Users will have to accept monochrome VGA displays with 16, 32 or 64 shades of grey (such as those from Aquiline and Twinhead), although there is a limit to the usefulness of shading.

There is practically no information on the amount of video RAM — 1M byte helps — or on performance, which varies significantly from product to product.

Access to an external display is usually available, but not at higher resolutions than VGA. The 8514/A or Extended Graphics Array modes supported by IBM are preferable for taking full advantage of large monitors.

Power. A long battery life is more critical for OS/2 than for DOS. As a rule of thumb, batteries last about one-half to two-thirds of the published time with DOS, and you can expect less than that with OS/2.

Metal hydride batteries will usually last longer than the more common nickel cadmium ones, but other than Toshiba, Grid and IBM, not many vendors offer them as a standard feature. Spare batteries should be considered standard. Although IBM includes them in its base package, most vendors offer spare batteries as an option.

Pointing device. Built-in trackballs are the most convenient devices for travel, but their type and quality varies, and not all users are comfortable with them. Mice are more of a hassle when traveling but are more popular and can serve a desktop, too. Vendors should offer both, leaving it to the user to decide whether and when to use either.

.....

In general, for every option or add-on, there should be, where appropriate, measurements, weight and a list price so that implications for various configuration choices can be readily figured out. For example, the weight of a spare battery can be significant relative to the machine's weight. Compaq's is 1.2 pounds. Ditto for AC adapters, which also tend to be bulky.

Note: This is part of ongoing research into the OS/2 notebook market in an effort to produce a better specifications table that will be regularly updated. Vendors and users interested in this subject are invited to contact the author. You can reach him on MCI Mail (FPascal), CompuServe (73677,3306) and, after July 30, at (415) 325-0646 (voice).

Pascal is a Palo Alto, Calif., independent consultant, teacher and writer specializing in relational database management and office and portable computing.

OS/2 blues

The perfect OS/2 notebook does not yet exist. However, you can settle for a 'good' OS/2 notebook if you look for the following features:

Compatibility: Thoroughly test it to ensure that it runs OS/2.

CPU: 80486 would be ideal except for the expense and weight; 386SL, SXL and SLC are advised, as well as a CPU cache and a math coprocessor. Upgradability would be ideal.

Bus: 32-bit data path is ideal, though nonexistent; 16-bit is advised.

RAM: 8M bytes minimum; 12M bytes preferred; 70 nsec. speed is optimal.

Storage: 60M bytes minimum; 120M bytes preferred. External backup device. SCSI support.

Display: Color is ideal but expensive. You will have to accept monochrome VGA displays with 16, 32 or 64 shades of gray. External displays, dual-screen operation are ideal.

Power: Metal-hydride batteries recommended. Spare batteries are essential, as is a short recharge time.

Pointing device: Built-in trackball devices are most convenient for travel; mice are more popular. Look for a machine that offers both.

Source: Fabian Pascal

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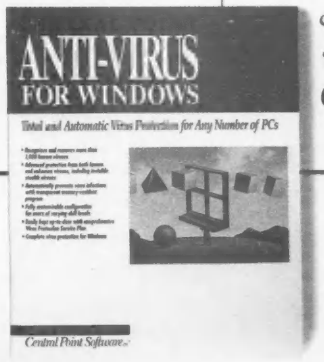

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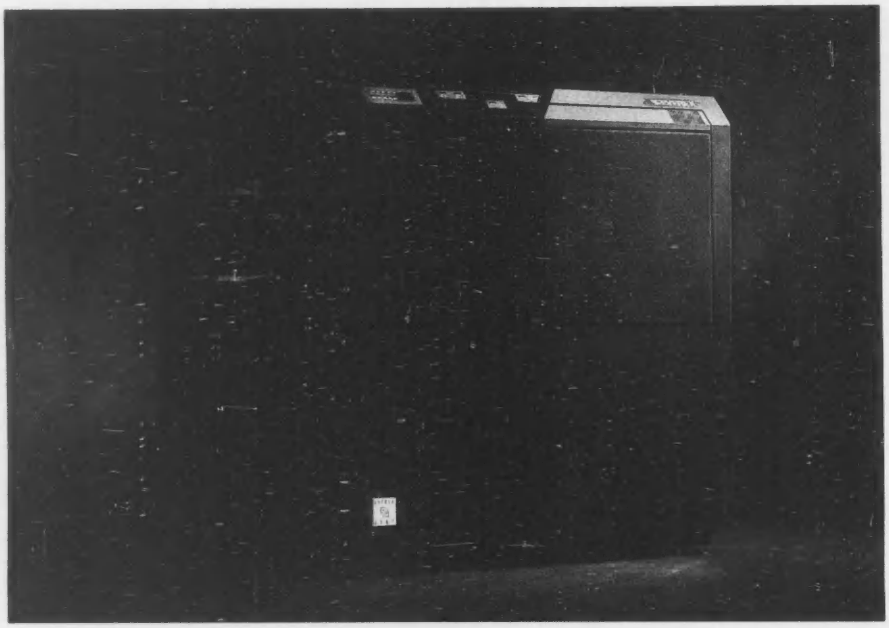

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Neal Nelson Business Benchmark (Test 1, normal task)—in seconds* (60 users)	16	19	29
Maximum number of CPUs	6	6	2
Second-level cache for each CPU?	YES	YES	NO
Error Correction Code (ECC) memory?	YES	YES	NO
4MB SIMM memory?	YES	NO	NO
Additional memory boards required for 64MB RAM	0	3	0
Full height 5.25" drives in base unit?	3	0	2
Order system without hard drives?	YES	NO	NO
Drive bays easily accessible with thumbscrews?	YES	NO	NO
Spacious interior for easy servicing?	YES	NO	NO
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*Systems tested in configurations with similar suggested retail prices: Everex: 4 CPUs, $38,501; DEC: 2 CPUs, $38,950; Compaq: 2 CPUs, $38,443.
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Atronics International, Inc. (510) 656-8400	ATI-NBSX20	386SX	DOS 5.0, Windows 3.1, OS/2 2.0, Unix V	6	2.13 x 11.38 x 8.63	9	Backlit supertwist	20M/120M	2M/4M	1 serial, 1 parallel, PS/2 mouse, external VGA monitor	1/12V NiCad	6-8 hours slow charge; 1-2 hours external quick charge	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapter, batteries	No	Mouse	No	Yes	$1,595 includes 20M-byte hard drive, floppy disk, 1 serial port, 1 parallel port, adapter, carrying case
Austin Computer Systems (512) 339-3500 (800) 752-1577	Austin 386SXL-25 Notebook	386SXL	DOS 5.0, Windows 3.1	6.2	2 x 11 x 8.5	10	Mono-chrome STIV LCD paned with side backlight	60M/120M	2M/8M	1 serial, 1 parallel, 1 external monitor, 1 keyboard port	1/NiCad	2 hours	Optional: Fax modem, Windows; Standard: Carrying case, AC adapter, batteries, mouse	No	Trackball	Yes	Yes	$1,690 includes battery, carrying case, AC adapter, manuals
Beaver Computer Corp. (408) 944-9000	Avanti 025	386SXL	DOS 5.0, Windows 3.1, OS/2 2.0	6.5	1.7 x 11 x 8.5	10	Triple backlit supertwist	85M/135M	4M/8M	1 serial, 1 parallel, 1 VGA, phone, line, mouse	1/NiCad	1 hour	Standard: Modem, fax modem, Windows, mouse, carrying case, AC adapter, batteries	No	Trackball	No	Yes	$2,495 includes modem, fax modem, Windows, mouse, carrying case, AC adapter, batteries
Commax Technologies, Inc. (408) 435-5000	Ultrathin	386SX	DOS 5.0, Windows 3.0., 3.1, OS/2 2.0, DR DOS 5.0, 6.0	4.5	1.4 x 11 x 8.5	9	Triple backlit supertwist	60M/120M	2M/4M	1 serial, 1 parallel, 1 PS/2 port, 1 VGA port	1/NiCad	5 hours	Optional: Fax modem, Windows, mouse; external battery; Standard: Carrying case, AC adapter, batteries	No	Any PS/2 input device	No	Yes	$1,699 includes 60M-byte hard drive, 2M-byte RAM; $2,199 includes 120M-byte hard drive, 4M-byte RAM
Copam USA, Inc. (510) 623-8911	NB 386SXL/20, NB386-SLC/20	386SX, 386SL	DOS 5.0, Windows 3.1, OS/2, Unix, Xenix	4.2, 4.8	1.5 x 11 x 8.6, 1.8 x 11 x 8.6	9	CCFT backlit	40M/120M	2M/4M, 2M/6M	2 serial, 1 parallel, 1 external VGA display connector, 1 external keyboard connector	1/7.2V NiCad, 9.6V NiCad	NP	Optional: Fax modem, Windows, mouse, carrying case, car cigarette lighter adapter, numeric keypad, 2M-byte expansion card, docking station; Standard: AC adapter, batteries, PC links, PC Tools	Yes	Mouse	No	Yes	$1,818
Dell Computer Corp. (512) 338-4400 (800) 289-3355	Dell System 325N	386SL	DOS 5.0, Windows 3.1, OS/2 2.0, Dell Unix 5.4	6.4	2.1 x 11 x 8.5	9.5	VGA edge-lit LCD	60M, 80M, 120M/ 120M	4M/12M	1 serial, 1 parallel, 1 mouse, keyboard, keypad, 1 external VGA	1/Nickel metal hydride	3.5 hours	Optional: Fax modem, Windows, mouse, carrying case, spare battery pack; Standard: AC adapter, batteries	No	Trackball, numeric keypad	No	Yes	$2,499 includes 4M-byte RAM, 60M-byte hard disk drive, AC adapter, slip case, service and support
	Dell System 320SLi	386SL	DOS, Windows, OS/2	3.6	1.25 x 11 7.75	9.5	Reflective TSTN LCD	60M, 80M, 120M/ 120M	2M/10M	1 serial, 1 parallel, 1 mouse/ keyboard, 1 external VGA monitor	1/Nickel metal hydride	2-3 hours	Optional: Modem, carrying case; Standard: Windows, mouse, AC adapter, batteries	No	Trackball, numeric keypad	No	Yes	$2,149 includes 2M RAM, 60M-byte hard drive, DOS 5.0, Windows 3.0, battery, AC adapter, slip case
Delta Phase International (714) 768-6842	Diplomat Notebook Computer, Courier Notebook Computer	386SX	DOS, Windows, Unix	6.5	2 x 11.7 x 8.7	9	Backlit supertwist	40M/180M	4M/8M (Diplomat), 2M/6M (Courier)	1 serial, 1 parallel, 1 expansion	1/NiCad	5 hours	Optional: Modem, fax modem, mouse; Standard: Windows, carrying case, AC adapter, batteries	Yes	Trackball, mouse	No	Yes	$1,995 (Courier), $2,419 (Diplomat with Windows); both include 40M-byte hard drive
Digital Equipment Corp. (800) 722-5111	DECpc 320T Notebook	386SX	DOS 5.0, Windows 3.1	6.4	1.7 x 12.3 x 10	8.5	Twist backlit	40M/80M	2M/8M	1 serial, 1 parallel, 1 keyboard, 1 VGA	1/NiCad	1 hour	Optional: Fax modem, leather carrying case; Standard: Modem, Windows, mouse, vinyl carrying case, AC adapter, batteries, 40M-byte hard drive, DOS 5.0, 3.5-in. 1.44M-byte floppy disk	No	Trackball	No	Yes	$1,995 inclues 40M-byte hard drive, modem, 3.5-in., 1.44M-byte floppy disk, DOS 5.0, Windows 3.1, vinyl carrying case, AC adapter, battery pack, Logitech Trackman
Everex Systems, Inc. (510) 498-1111 (800) 821-0806	Tempo Carrier	386SX	DOS 5.0, Windows 3.1, OS/2	5.3	1.8 x 11 x 8.5	8.5	Backlit supertwist	40M/80M	2M/8M	2 serial, 1 parallel, external VGA, external keyboard	1/NiCad	1.5 hours	Optional: Fax modem; Standard: Windows, mouse, carrying case, AC adapter, batteries, video utilities	No	J Key	Yes	Yes	$2,195 includes 40M-byte hard drive, 2M-byte RAM; $2395 includes 40M-byte hard drive, 2M-byte RAM, fax modem
Goldstar Technology, Inc. (408) 432-1331	GS620	386SX	DOS 4.01, 5.0, Windows 3.0, 3.1	6.2	2 x 11 x 8.5	9	Backlit supertwist	40M/-80M +	2M/4M	1 serial, 1 parallel, VGA monitor	1/NiCad	1.5 hours	Optional: Modem, fax modem, Laplink V.3.0 utility software; deluxe carrying case; Standard: Carrying case, AC adapter, batteries	No	Trackball, mouse	No	No	$1,995 includes carrying case, adapter, batteries, DOS, 2M-byte RAM, 40M-byte hard drive, 3.5-in. disk drive
Jamicon Corp. (213) 266-8006	Jamicon Notebook PC	386SX	DOS 5.0, Windows 3.0, OS/2, Unix, Xenix	5.7	2.05 x 11 x 8.66	9	CCFT backlit	20M/80M	2M/4M	1 serial, 1 parallel, VGA, external PS/2 mouse, scanner	1/NiCad	6-8 hours	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapater, batteries	No	Mouse, scanner	No	Yes	$1,350 includes 386SX-16, 2M-byte RAM, 20M-byte hard drive
Jetta International, Inc. (908) 329-9651	Jetbook 386SL/25, Jetbook 386SXL/25	386SL, 386SXL	DOS 5.0, Windows 3.1, OS/2 2.0	6.5	2 x 11 x 8.5	9	Backlit supertwist	60M/120M	2M/16M	1 serial, 1 parallel	1/NiCad	7.5 hours	Optional: Modem, fax modem; Standard: Carrying case, AC adapter, battery	Yes	Mouse	Yes	Yes	$2,495 (Jetbook 386SL/25) includes 2M-byte RAM, 60M-byte hard drive; $2,095 (Jetbook 386SXL/25) includes 2M-byte RAM, 60M-byte hard drive

All products listed are 386-based and weigh 6.5 pounds or less.

The companies included in this chart responded to a recent survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Contact vendor for further product information.

DIGITAL UPDATE
THE OPEN ADVANTAGE
JUNE 1992

Tot ALLy RaD

With the traditional model for software development, each phase of a project is completed separately and sequentially. Rapid Application Development (RAD) takes a *different* approach.

With RAD, development is collaborative and concurrent. Design, prototyping, coding, and other functions overlap with areas formerly left until the end of a project, like user testing. Such concurrent development significantly reduces the amount of time required to create software.

Digital has partnered with a number of leading software vendors to integrate a variety of application generators into the COHESION environment. This provides our COHESION customers with several options for implementing a RAD solution. Here, we're focusing on one option for RAD that's built around Digital's fourth-generation application generator: DEC RALLY.

As a software development product, DEC RALLY supports the RAD style, enabling users and programmers to work together as an application evolves. Thus, initial development and maintenance become a continuous, evolutionary process — with fixed delivery points along the way for initial application release, next version, and so on.

"Facing new constraints in the coming market, software developers will be forced to implement **concurrent engineering** to reduce the software development cycle to just over a year. At Digital, we're certainly facing these market pressures. Just like our customers, we have to bring **software to market faster** in order to **increase profitability.** And that's why we've been refining our own software development process to a rapid, concurrent model."

David Stone, Vice President
The New Software Group
Digital Equipment Corporation

The DEC RALLY Advantage: Dynamic Editing, Rapid Prototyping

Because of its object-based design, DEC RALLY enables changes to be made to complex programs in minutes. If, for example, a change is suggested during a user review, the developer simply presses two keys to enter the development environment and then edits the program right then and there. One more keystroke, and the developer can return to running the application with the change that's just been made.

While other source-code-based application generators may appear to have this quick ability in a demo, keep in mind that in reality, complex on-screen editing is impossible in source-code-based systems. To use the more advanced features of source-code-based tools, the prototype must be exported to a separate development environment.

DEC RALLY's ability to respond instantly to potential users' review of an application not only ensures faster development but also helps to encourage up-front agreement on the direction that development is taking. This rapid prototyping minimizes false starts and avoids the misunderstandings you know can occur when users and programmers have to "imagine" what a change would do to a piece of software.

RALLY 'Round the Client/Server Environment

Today's application generation reality: You develop software for and in a distributed environment. And that's where DEC RALLY operates — in complete support of client/server computing.

The RALLY client/server vision calls for continuing to extend the multivendor capabilities, giving software developers and project leaders a consistent development environment across different projects and platforms.

Consider the fact that Digital has recently released DEC RALLY Version 3 for VMS to support MS-DOS platforms in target applications, accessing an Rdb/VMS database on the VMS server. We've also announced and demonstrated DEC RALLY Version 4, which will offer run-time support for user platforms running RISC ULTRIX operating system software. RALLY V4 will also be a Motif-compliant user interface, giving developers popular Motif-style windowing capabilities.

The COHESION for Rapid Development with RALLY Solution:

Enhanced Integration Software
Team Development Support
Implementation Services

The COHESION for Rapid Development with RALLY solution is a package of Digital products, services, and special integrating software designed to facilitate team development and implementation of DEC RALLY applications.

The solution sets up an environment that supports the complete application development life cycle. It offers built-in guidelines for creating and organizing software development projects. And it makes it easier to define responsibilities, set up program modules, build systems, and manage change — all with a single, consistent user interface.

With Rapid Application Development, teamwork plays a more crucial role than ever in a project's success. With that in mind, the COHESION for Rapid Development with RALLY solution defines roles and responsibilities for your development team, including project leader, repository administrator, database administrator, and developer.

To boost overall productivity, the COHESION for Rapid Development with RALLY solution also automates a number of development procedures, such as creating the repository, code libraries, and directories. In addition, the solution can assign security and access as defined by the project leader, then build the RALLY application from its components and package the application for release. All these procedures are available from a common user interface, consistent with the DEC RALLY development interface.

Questions?
We Can Bring You Answers

If you're ready to implement a RAD environment, a lot of questions probably come to mind, like: How do you know what methods to select? What tools should you choose? What's the best method for training development teams?

You can look to Digital's consultants to help you find the answers.

A consultant can come to your site and work with you to define and implement solutions that are customized to the needs of your application development environment and tailored to fit smoothly into your organization.

RAD continued on next page

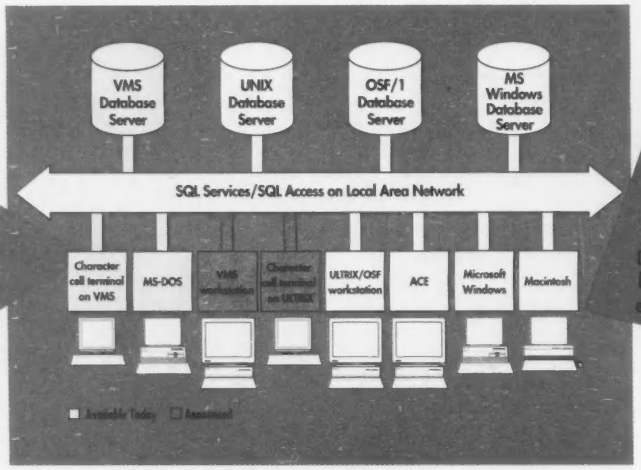
digital™

more on RAD

DEC RALLY Client/Server Vision

The goal is for DEC RALLY to support all players in today's open, multivendor computing environments, so you can:

- Use the environment of your choice
- Specify once, then run anywhere
- Provide access to your data, wherever it resides.



Ready for a DEC RALLY Demo?

All you need is a phone and an MS-DOS-based PC. Give us a call at 800-DEC-INFO (800-332-4636), ext. COHESION. We'll send you a 30-minute PC demo diskette that gives you more detailed information on the DEC RALLY product and the COHESION for Rapid Development with RALLY solution. You'll be able to see for yourself how Digital's experience with CASE can work to your benefit.

TAKE ADVANTAGE OF * DECdirect

100,000. That's the sum total of hardware, software, and networking products made available to you by calling 800-DIGITAL (800-344-4825), Monday through Friday, between 7:30 A.M. and 8 P.M. EST.

You can call DECdirect to order the latest VAX systems (up to and including the VAX 6000), workstations, PCs, and low-end networking and communications products. What's more, you can buy new or take advantage of our trade-in offer.

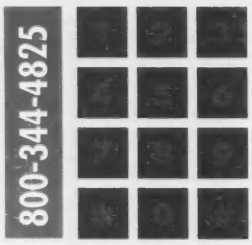
In addition, call DECdirect when you need:

- "Traditional" catalog products such as accessories and supplies, self-maintenance products, memory, storage, and other add-ons
- Technical and end-user training services or the Digital Reference Service
- Digital Press publications.

A phone call to 800-DIGITAL will also provide you with four important DECdirect features, including:

- **Dedicated Systems Ordering Specialists**
Ordering specialists who can offer you guidance in the selection and ordering of Digital workstations, personal computers, and servers.
- **Emergency Order Desk**
Handling your questions and providing self-maintenance solutions during critical "system-down" situations.
- **FASTship Service**
A quick delivery service that gets you what you need fast. All you have to do is call and place your order — it's shipped to you by the end of the next business day, all at no additional charge.
- **Government Order Group**
Providing dedicated services for and handling all requirements of government orders.

CALL 800-DIGITAL



With DECdirect, our telephone information and ordering service, Digital products and services are an easy phone call away.

Our Experts Are Ready to Answer Your Questions

You need to do some investigating before making any type of hardware, software, or service investment. We understand that and are ready to supply answers to all of your prepurchase as well as postpurchase questions.

For assistance, call 800-DIGITAL and speak to a representative from our Technical Consulting Center. These trained Digital representatives can provide you with technical product and service information, configuration advice, and recommendations for your most cost-effective solutions.

When you're ready to plan an order, DECdirect's Customer Administrators can provide you with price and availability information. At your request, a hard-copy quote with 60-day price protection can be delivered to you by fax or mail.

DECdirect Makes It Easy for You to Do Business

Once you've gathered the information you need, DECdirect makes placing your order as convenient as possible. To place an order, choose one of these options:

- Call 800-DIGITAL (800-344-4825)
- Utilize DECdirect's TOLL-FREE fax line at 800-234-2298
- Access Digital's online Electronic Connection by dialing 800-234-1998 at 1200 to 9600 baud, from any Digital-compatible terminal or PC.

What's more, you can use your credit card for DECdirect purchases — or receive an invoice if you prefer. DECdirect offers one-stop shopping for information, ordering, and customer service.

Just Call and Order – DECdirect Delivers

DECdirect is committed to providing you with timely information, quality service, and complete customer satisfaction. In addition, a contribution will be made to the U.S. Olympic Team when you order any of Digital's accessories and supplies and ship them via priority mail.

For more information on Digital's toll-free information and ordering services, call 800-DIGITAL (800-344-4825), ext. 975, and request Digital's FREE *Guide to Direct Access Information and Ordering Services.*

Digital's POLYCENTER Solution is both a vision and a reality. Today's POLYCENTER Solution components are designed for management of an organization-wide, multiplatform computing environment. Bringing you closer to the fully automated, self-managing, multiplatform environment of tomorrow.

By utilizing even a portion of POLYCENTER Solution offerings, businesses have been able to cut costs, improve productivity, and allocate resources more efficiently — thanks to the level of control, security, responsiveness, and accountability these products and services provide. Tomorrow's POLYCENTER Solution — to have complete implementation within four years — will ultimately manage your entire multiplatform, multivendor computing environment, from desktop to datacenter operations.

Recently, Digital moved closer to turning the complete POLYCENTER Solution vision into reality by introducing 23 new or enhanced products, services, and third-party partnerships that not only enable increased functionality for Open VMS systems, but also significantly enhance UNIX management capabilities.

As Information Increases, Management Needs Rise

System information must be easily accessed and efficiently managed if you're to maintain a competitive business edge in today's global market. To that end, Digital's POLYCENTER Solution offers you product and service solutions that cover critical areas such as configuration management, fault/problem management, performance management, security management, accounting, and administration.

What's more, all POLYCENTER components — including current and future products and services — will conform to Digital's Enterprise Management Architecture (EMA). Based on industry standards, EMA is an open architecture that provides access to information across multiple platforms and multiple vendors.

With this EMA-based POLYCENTER Solution, you're able to address current system challenges while you continue to grow into an open, heterogeneous environment. This type of evolutionary growth path protects your investment today and provides you with an easy upgrade path to future products and services.

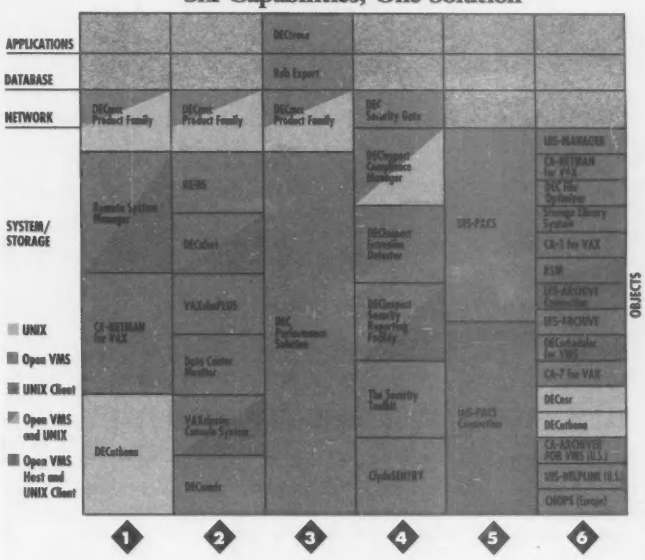
FREE Video Gives You More

To learn more about POLYCENTER Solution products and services, call 800-DIGITAL (800-344-4825), ext. 078, and request a FREE POLYCENTER Solution video.

ON THE ROAD *to an* Intelligent, Self-Managing Computing Environment

POLYCENTER Solution

Six Capabilities, One Solution



A growing number of POLYCENTER Solution capabilities — once available only for Open VMS system users — are currently being offered for ULTRIX and other UNIX variants. That means you can get the same level of system management expertise in six key areas, including:

1 Configuration/Change Management
Components in this category identify and manage the physical and logical relationships among resources as well as plan, distribute, apply, and track changes to your information system.

2 Problem/Fault Management
Products and services in this category help you prevent a critical situation by detecting, analyzing, correcting, and tracking incidents and problems in your system or network. Plus, many of these components offer you savings in both time and money by allowing you to automate many system responses.

3 Performance Management
POLYCENTER Solution performance tools ensure that your computing system is working efficiently and at full capacity. Included are products for performance analysis, optimization, and capacity planning.

4 Security Management
These products and services are your system "watchdogs" — ensuring appropriate security compliance and providing intrusion detection for your company-wide computer environment.

5 Accounting
With these components, you no longer have to spend time tracking and billing system users. POLYCENTER Solution accounting tools monitor resources used and provide appropriate tracking and billing.

6 Administration
These products and services accomplish day-to-day administrative tasks, including media and storage management, scheduling, user account management, and end-user help desk functions — giving you time to focus on business rather than paperwork.

For more on POLYCENTER Solution products, turn the page.

NEWS FLASH

Get the FAX Right at Your Desktop

Digital's FAX Network Gateway products, developed as a corporate fax server for enterprise-wide fax messaging, enable you to send and receive facsimiles from your desktop — with the same ease that electronic mail provides. You can use a broad range of Digital's electronic mail services, including VMS mail, ALL-IN-1, and PCMAIL under PATHWORKS to send and receive critical information via facsimile. FAX Network Gateway offerings let you:

- Store, print, and forward incoming faxes to multiple locations or directly to your account
- Send faxes in a variety of formats, including DDIF bitonal images, ASCII text, PostScript, and HP-GL files
- Receive faxes in DDIF, sixel, or PostScript formats for subsequent printing or viewing
- Take advantage of automatic routing through Optical Character Recognition Software, an optional feature.

What's more, Digital has integrated the FAX Network Gateway with other applications including DECrad and DEC Image Express.

Digital's FAX Network Gateway products have proven successful within a broad customer base that includes the banking, transportation, education, and manufacturing industries.

For information on Digital's FAX Network Gateway products, call 800-231-7935.

Refurbished HDAs Combine Quality and Savings

If you're in the market for HDAs, look to Digital. Our refurbished large and small form factor HDAs offer you high quality at up to 65 percent savings. These HDAs are tested to ensure the same high level of performance and reliability you expect from Digital parts. In addition, each refurbished HDA comes with a one-year return warranty. Here's a sampling of the savings on refurbished HDAs with exchange.

HDA	Old Price	New Price	Save
RA81	$4,706	$1,695	64%
RA82	$6,039	$3,301	45%
RA90 (Long)	$13,405	$4,600	65%
RA90 (Short)	$9,600	$6,525	32%
RA92	$15,113	$7,585	50%
RF71	$1,950	$1,725	12%
RD53	$550	$420	24%
RD54	$600	$525	12%

New additions at substantial savings include:
RA71 at $1,155 RA72 at $1,155 RF72 at $1,650

Refurbished HDAs without an exchange are also available. For information or to order, call 800-225-5385.

POLYCENTER Solution

Better System Management Calls for Better Tools

Increase System Control and Performance with VAXcluster Console System, DECperformance Solution

Effective system management is crucial to the overall success of your business — especially in today's increasingly complex technological world. You need system management tools that will help you centralize control of your data, streamline operations, and increase productivity.

VAXcluster Console System and DECperformance Solution — components of Digital's POLYCENTER Solution — are two system management tools that will save your business time and money.

VAXcluster Console System (VCS) Gives You Data Control from One Location

VCS, Digital's DECwindows-based system management software, centralizes console management in distributed environments — giving you access to and control of multiple data centers from a single location. Powerful VCS capabilities enable you to eliminate multiple console terminals, optimize floor space, improve planning, and ultimately save both time and money.

Running under Open VMS on a VAXsystem host, VCS software:

- Monitors up to 32 Digital and non-Digital devices automatically
- Brings all console messages online into a multiwindow display and control environment
- Archives all console information for tracking and audit purposes
- Provides console playback capability and security.

What's more, Digital's latest VCS offering, VCS V1.4, enhances your system management capabilities with new features, including:

- An emulation package for running console simulations without risk to the production environment — the perfect tool for offline training, problem diagnosis, and production-safe development testing
- Enhanced "scan profile" ability that expands the number of events detected using standard templates
- High availability of system control functions, achieved by installing VCS on the fault-tolerant VAXft platform.

VCS V1.4 allows you to manage consoles from any device that has an EIA console port, sends ASCII data over an RS232 connection, and supports XON/XOF and I/O buffering. Devices include Digital VAX and RISC-based systems, VAXcluster systems, VAXft systems, Digital workstations, intelligent line printers such as the LPS40, and others. Plus, VCS V1.4 offers flexibility by allowing you to check console performance and status from remote locations, and to execute console functions from remote sites.

> "We're very happy with VAXcluster Console System and how it's helping us manage and support our Digital environment more efficiently. Our operations and system management personnel have found VCS to be vital in the support of over 50 of 3M's Digital systems."
>
> **Rod Mendenhall**
> **Senior Analyst**
> **3M Corporation**

Maximize System Capacity, Plan for System Changes with DECperformance Solution

You must maximize current system resources and efficiently plan for future system needs. How do you do both at minimal cost? Digital gives you a comprehensive answer: DECperformance Solution (DECps) V1.0.

DECps consists of four integrated products that free you from the many conflicting requirements needed for capacity management and performance measurement.

The DECps product family not only monitors, controls, and modifies your system's capabilities today, but it also provides automated analysis on future system developments — information that is key to accurate planning. What's more, DECps enables you to monitor multiple nodes from a central location.

DECps products and capabilities include:

- **DECps Data Collector**
  Gathers and manages user-specified Open VMS system data.
- **DECps Performance Advisor**
  Provides comprehensive analysis on system degradation and offers recommendations for improving system performance — in the form of automatic reports or full-color graphs.
- **DECps Capacity Planner**
  Determines system performance under varying work loads through simulation of "what if" situations.
- **DECps Accounting Chargeback**
  Generates reports of charges based on system resource utilization.

Not only do these four separate and extensive DECps functionalities relieve you of time-consuming evaluation tasks, but their separate availability also allows you to install only those components you need.

With enhanced features, including a tabular reporting format, better planning capabilities for complex environments, and a DECwindows interface, DECps provides you a pathway for reducing system costs and maximizing production.

For more information or to order VAXcluster Console System V1.4 or DECperformance Solution V1.0, call 800-DIGITAL (800-344-4825), ext. 212.

Something Troubling Your System? DECamds Gives You the Data — and the Answer Fast

DECamds, Digital's Availability Manager for Distributed Systems, not only helps you prevent availability problems within your distributed computing system from escalating into crisis situations, but also increases system availability and staff productivity.

How? By offering you realtime data from a centralized console where and when you want it. What's more, you can examine data, adjust the frequency and scope of data collection, and execute instructions that fix specific problems on a remote node — all from one location.

> "While using DECamds, we have, on more than one occasion, survived and corrected mistakes that would have previously resulted in crashing the systems."
>
> **Christopher S. Yetman**
> **Principal Consulting Engineer**
> **VAX Systems and Networks**
> **EDS Personal Communications Corporation**

Unique Data Collection Allows for Realtime Action

As one of many components of our POLYCENTER Solution, DECamds enables you to concentrate on continuous improvements in day-to-day system activity through a new concept in data collection.

Rather than a cumbersome, memory-resident data collector, DECamds loads a lean pseudo-device on each monitored node. Acting like an I/O device, the data collector strips instructions off the Ethernet, executes them, and reports back to a remote console.

When a node is hung, DECamds lets you change process parameters or shut down the node. When a cluster hangs, DECamds eliminates guesswork by identifying the problem node and letting you shut it down, thereby restoring cluster services.

Windows Make It Easy

A standard DECwindows interface makes DECamds easy to learn and use. Data display windows using visual cues such as color and dynamic bar graphs give enhanced clarity to complex data.

Designed for Open VMS clusters, DECamds can also display summary statistics and graphs about multiple clusters and nodes in one window while displaying a single process or lock in another window.

DECamds offers you proactive capabilities that help you identify system trouble spots and help you take corrective action in real time. In short, DECamds lets you make better decisions faster.

Order Information

DECamds Console Software License Order # QL-GVZA9-AA/AJJ	$23,600
DECamds Driver Software License Order # QL-GW3A*-AA/AJJ	$225 to $9,420
DECamds Software (Console and Driver software included)	
DECamds TK50 QA-GVZAA-H5/AJJ	$310
DECamds 16 MT9 QA-GVZAA-HM/AJJ	$305

**Denotes variant fields.*

For more information or to order DECamds, call 800-DIGITAL (800-344-4825) and ask for Dept. 20F.

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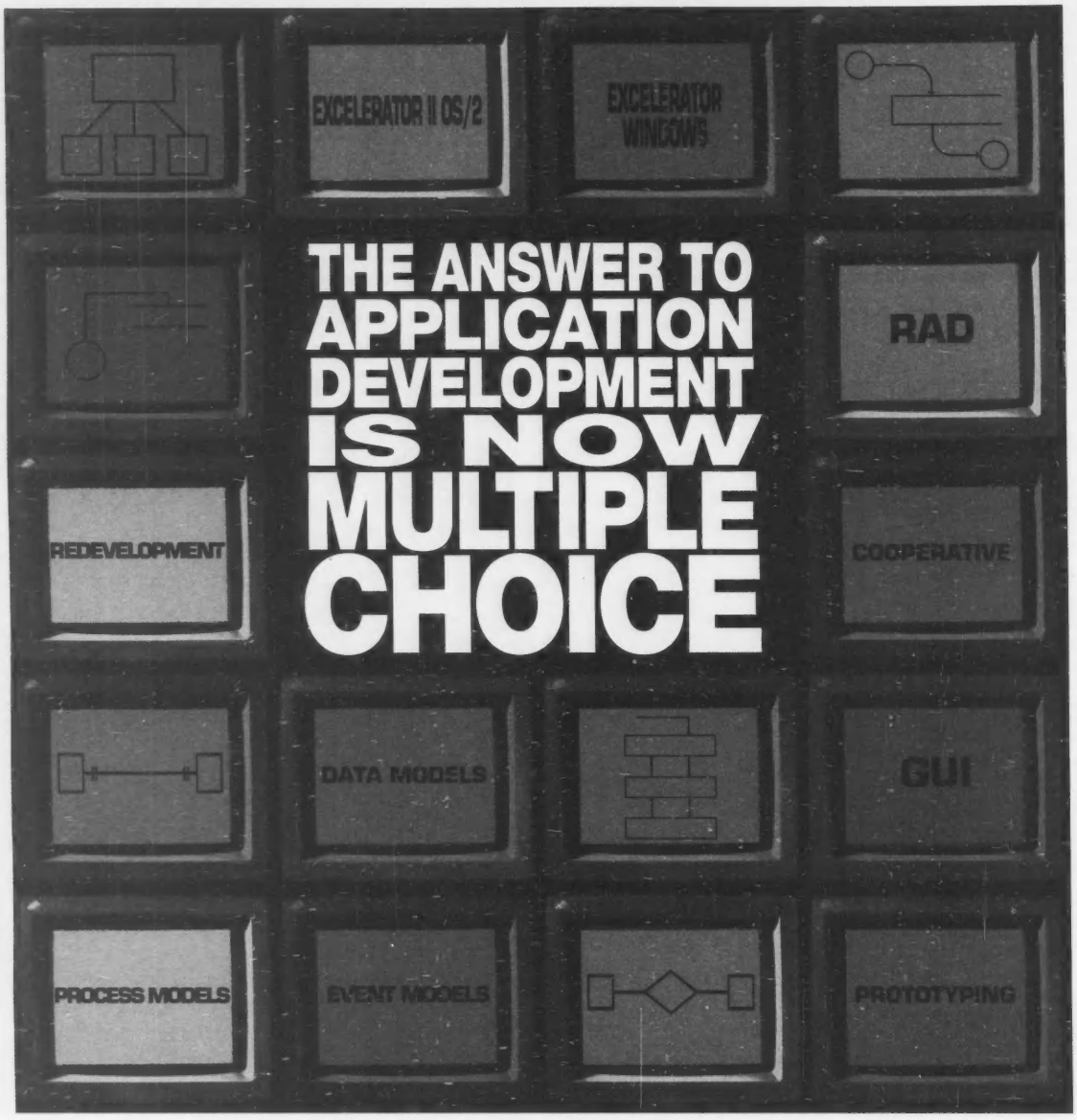
VENDOR	PRODUCT	PROCESSOR TYPE	OPERATING SYSTEM SUPPORTED	WEIGHT (POUNDS)	DIMENSIONS (H x W x L)	SCREEN (DIAGONAL INCHES)	SCREEN DISPLAY	STANDARD/MAXIMUM HARD DISK DRIVE (BYTES)	RAM INCLUDED IN BASE SYSTEM/MAXIMUM RAM	NUMBER/TYPES OF PORTS SUPPORTED	NUMBER/TYPE OF BATTERY INCLUDED	BATTERY RECHARGE TIME	FEATURES	EXPANSION STATION SUPPORTED	ALTERNATIVE INPUT DEVICE SUPPORTED	SIMULTANEOUS DISPLAY CAPABILITIES	EXTERNAL KEYBOARD PORT	PRICE
Kris Technologies (415) 875-8729	KRIS Master 386SXL	386SXL	DOS 5.0, Windows 3.1	6	2 x 11 x 8.5	9	Backlit supertwist	40M/130M	2M/16M	2 serial, 1 parallel, dedicated expansion port	1/NiCad	3 hours	Optional: Modem, fax modem, Windows, mouse, batteries, external color VGA port; Standard: Carrying case, adapter	Yes	Trackball, mouse	No	Yes	$1,575 includes 2M-byte RAM, 40M-byte hard drive, carrying case
Leading Edge Products, Inc. (508) 836-4800 (800) 874-3340	N3/SL25	386SL	DOS 5.0, Windows 3.1, OS/2 2.0	6.4	1.8 x 11.2 x 8.7	10	Triple backlit supertwist	60M/80M	2M/10M	1 serial, 1 parallel, keyboard/ mouse, 1 external Super VGA	1/NiCad	2 hours	Optional: Fax modem, carrying case, mouse; Standard: Windows, AC adapter, batteries, J mouse	No	J Key	Yes	Yes	$2,199 includes 2M-byte RAM, 60M-byte hard drive, DOS, Windows, Works for Windows; $2,399 including 2M-byte RAM, 80M-byte hard drive, DOS, Windows, Works for Windows
Librex Computer Systems (408) 441-8500	Librex T386SX	386SX	DOS 5.0, Windows 3.1	5	1.4 x 11.7 x 8.4	9.5	VGA backlit	40M/120M	4M/12M	1 serial, 1 parallel, 1 Super VGA, PS/2, PCMIA standard 2.0, expansion bus	1 pack/ Nickel metal hydride	3 hours	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapter, batteries, removable hard drive, floppy disk	Yes	Trackball, mouse, flash memory, Laplink	Yes	Yes	$2,499 includes DOS 5.0, 40M-byte hard drive, floppy drive, universal AC adapter, QA Plus, Laplink Pro
	C.386SX	386SX	DOS 5.0, Windows 3.1	6	2 x 11.7 x 8.4	9.5	VGA backlit	60M/80M	4M/4M	2 serial, 1 parallel, VGA	1/NiCad	5 hours	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapter, batteries	No	Trackball, mouse	No	No	$2,249
	Librex V 386SX	386SX	DOS 5.0, Windows 3.1	6	1.9 x 11.6 x 8.3	8.5	VGA backlit	60M/60M	1M/5M	1 serial, 1 parallel, 1 VGA, 1 PS/2 mouse	1/NiCad	1 hour	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapter, batteries, memory modules	No	Trackball, mouse	No	Yes	$1,999 includes 1M-byte RAM, 60M-byte hard drive, QA Plus
SAI Systems (203) 929-0790 (800) 321-0488	SAI Book 386-33	386DX	DOS 5.0, Windows 3.1, OS/2, all Unix-based systems	6	2.3 x 11 x 8.7	9	Backlit supertwist	60M/120M	2M/8M	1 serial, 1 parallel, scanner port	1/NiCad	2 hours	Standard: Fax modem, Windows, mouse, carrying case, AC adapter, batteries, DOS 5.0	Yes	Trackball, mouse, scanner	Yes	Yes	$2,195 includes fax modem, Windows, mouse, carrying case, AC adapter, battery, DOS 5.0
Samsung Electronics America Information Systems, Inc. (201) 229-4000	NoteMaster 386L/25	386SL	DOS, Windows, OS/2	5.8	1.8 x 11 x 8.5	10	Backlit supertwist, CCFT VGA	60-120M/-120M+	2M/8M	1 serial, 1 parallel, 1 VGA, keyboard, mouse, 1 numeric keypad	1/NiCad or alkaline	3 hours (internal), 1.5 hours (external)	Optional: Modem, fax modem, extra batteries, numeric keypad, 2M-, 4M-, 6M-byte memory, quick charger, deluxe carrying case; Standard: Carrying case, AC adapter	Yes	Trackball, mouse, J key	No	Yes	$2,499 includes 2M RAM, DOS 5.0, 60M-byte hard drive, carrying case, batteries
	NoteMaster 386/25	386SXL	DOS, Windows, OS/2	5.8	1.8 x 11 x 8.5	10	Backlit supertwist, CCFT VGA	60-120M/-120M or greater	2M/8M	1 serial, 1 parallel, VGA, mouse or external keyboard, numeric keypad	1/NiCad, 1/Alkaline battery pack	3 hours (internal); 1.5 hours (external)	Optional: Modem, fax modem, numeric keypad, 2M-, 4M-, 6M-byte RAM, quick charger, deluxe carrying case, extra battery; Standard: Carrying case, AC adapter, NiCad battery	Yes	Trackball, mouse, J key	No	Yes	$2,299 includes 2M-byte RAM, DOS 5.0, 60M-byte hard drive, carrying case, alkaline pack, NiCad battery
Swan Technologies (814) 238-1820 (800) 445-9044	Swan 386SX/25 Notebook	386SXL	DOS, Windows	5.8	1.8 x 11 x 8.5	10	Triple backlit supertwist, sidelit	40M/80M	2M/8M	1 serial, 1 parallel, PS/2 mouse port, external keypad	2/NiCad	2-3 hours	Optional: Modem, fax modem, Windows, mouse; Standard: Carrying case, AC adapter, batteries	No	Trackball, mouse	No	Yes	$1,895 includes 2M-byte RAM, 40M-byte hard drive
Texas Instruments, Inc. (800) 527-3500	TravelMate 3000	386SX	DOS 5.0	5.7	1.8 x 11 x 8.5	10	Triple sidelit supertwist	20M/40M	2M/6M	1 serial, 1 parallel	1/NiCad	3-5 hours	Optional: Modem, fax modem, AC adapter; Standard: Carrying case, batteries	Yes	None	No	No	$2,199 (20M-byte hard disk); $2,299 (30M-byte hard disk); $2,349 (40M-byte hard disk)
Twinhead Corp. (408) 945-0808 (800) 545-8946	Slimnote 386SXL/25	386SXL	DOS 5.1, Windows 3.1, OS/2 2.0, Unix V 386 3.2	5.8	1.7 x 11 x 8.5	10	Sidelit CCFT	60M/130M	2M/6M	1 serial, 1 parallel, external floppy disk drive, 1 PS/2, 1 Super VGA, 1 mouse, numeric keypad, 1 100-PIN expansion connector	1/NiCad	1 hour	Optional: Modem, fax modem, Windows, mouse, carrying case; Standard: AC adapter, batteries, DOS 5.0	No	Trackball, mouse	Yes	Yes	$1,999 includes 1-year service, DOS, battery, AC adapter
Veridata Research, Inc. (818) 303-0613	Execulite 386S/25e	386SXL	DOS 5.0, Windows 3.1	5.8	1.4 x 11 x 8.6	8.5	CCFT backlit	60M/120M	2M/8M	1 serial, 1 parallel, second serial port is optional	1/NiCad	2.5 hours	Optional: Fax modem, mouse, carrying case; Standard: AC adapter, batteries	No	Mouse pad	No	Yes	$1,730 includes 2M-byte RAM, 60M-byte hard drive
Wyse Technology, Inc. (800) 438-9973	Decision Mate	386SX	DOS 5.0, Windows 3.1	4.5	1.45 x 11 x 8.6	8.5	Triple backlit supertwist	30M, 40M, 60M/60M	1M, 2M, 4M/8M	1 serial, 1 parallel, 1 mouse/key-board (PS/2), 1 VGA	1/NiCad	1.5 hours	Optional: Modem, fax modem, Windows, mouse; Standard: carrying case, AC adapter, batteries, Laplink and cable, physical security lock, battery watch, Ultrafont	No	PS/2 type devices	No	Yes	$1,899 includes 1M-byte RAM, 30M-byte hard drive, carrying case, security lock, Laplink, battery watch, Ultrafont
Zenith Data Systems (800) 553-0331	Z-Sport 3255 Model 60, Model 85	386SX	DOS 5.0, Windows 3.1	6	1.9 x 11 x 8.5	9.5	CCFL	60M/85M	2M/8M	1 serial, 1 parallel, 1 external VGA video, 1 PS/2 mouse/-keyboard, keypad, 1 AT connector for optional docking unit	1/Nickel metal hydride	NP	Optional: Modem, fax modem, mouse, carrying case, three-slot AT docking unit; Standard: Windows, AC adapter, battery, internal self-maintaining battery	Yes	Keyboard, numeric keypad	NP	Yes	$2,299 includes 85M-byte hard drive, Windows, AC adapter, battery, self-maintaining battery; $2,199 includes 60M-byte hard drive, Windows, AC adapter, self-maintaining battery



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Romance still strong for PowerBook users

BY DEREK SLATER
CW STAFF

Users are on an extended honeymoon with Apple Computer, Inc.'s PowerBook 140 notebook computer. The new PowerBook took the highest satisfaction score in nearly every category of the Buyers' Scorecard on notebook computers.

Three models of the PowerBook line — Apple's first portable systems since the poorly regarded Macintosh Portable — have been shipping since October of last year. The other four notebooks in the survey, all based on Intel Corp.'s 20-MHz 80386SX chip, have been available for a year or more. The Intel-based models finished the Buyers' Scorecard in a pack well behind the PowerBook's overall score of 78.

Buyers' Scorecard measures users' satisfaction with their installed technologies. Users assigned ratings on a scale of 1 to 10 in 16 specific categories. The users also rated the relative importance of each category. (See the methodology on the next page for a description of the scoring process.)

The PowerBook 140 lists for $2,999, including a 40M-byte hard drive and a built-in trackball. It is based on Motorola, Inc.'s 16-MHz 68030 processor and weighs just over five pounds. The only area in which the PowerBook rated poorly relative to its competitors was in compatibility with current software.

Second place featured a tie between Toshiba America, Inc.'s T2200SXE and AST Research, Inc.'s Premium Exec 386SX/20, each with a score of 72. Toshiba's T2200SXE placed just behind the PowerBook in performance categories. However, its highly touted nickel hydride battery technology (all others in the survey use nickel cadmium batteries) failed to distinguish the T2200SXE in battery life, where it rated fourth. The T2200SXE's 16-shade grey-scale display also did not impress users, who rated it last in screen readability. List price is $2,949 for the T2200SXE with a 60M-byte hard drive.

AST's Premium Exec ($2,395) topped the areas of compatibility with current software and ease of maintenance. It also scored well in vendor service and support. Weaknesses were in battery life and processing performance.

Compaq Computer Corp.'s LTE 386S/20 fared well, despite being the oldest model in the roundup. The LTE has several handicaps, including the nonstandard, L-shaped cursor key layout and the system's weight (more than eight pounds). Users rated the LTE last in keyboard ease of use and portability, as well as value for the dollar. However, the strengths of the LTE — battery life of more than three hours, availability of expansion options such as a docking station and hard disk performance — also showed in the survey. Newer models from Compaq, including the recently announced LTE Lite/25, address user concerns about size, weight and keyboard layout.

NEC Technologies, Inc.'s UltraLite is in its third incarnation, the UltraLite III SX/20. The current version costs $3,499 with a 20M-byte hard drive. In verbatim responses, many users praised the UltraLite's paper-white display, which rated second place in screen readability. ●

Notebook PCs

Total scores reflect average user ratings for all measured areas, weighted by user-assigned importance. Response base: Apple, 48; Toshiba, 42; AST, 42; Compaq, 45; NEC, 27.

Total possible score **100** Mean score **73**

Product	Highest ratings	Lowest ratings
Apple's PowerBook 140 SCORE 78	Compatibility with current software Portability Quality of vendor support	Security features Expansion options Adequate battery life
Toshiba's T2200SXE SCORE 72	Compatibility with current software Portability Durability and ruggedness	Security features Adequate battery life Networking capability
AST's Premium Exec SCORE 72	Compatibility with current software Portability Responsiveness of vendor service	Security features Expansion options Networking capability
Compaq's LTE 386S/20 SCORE 71	Compatibility with current software Portability Durability and ruggedness	Security features Keyboard ease of use Screen readability
NEC's UltraLite SCORE 70	Compatibility with current software Portability Processing performance	Security features Responsiveness of vendor service Adequate battery life

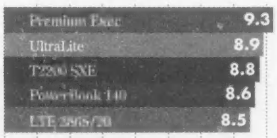
RATINGS IN ORDER OF IMPORTANCE

AST's Premium Exec captures first place in the most important category, compatibility with current software, while Apple's PowerBook 140 takes first in the next five areas.

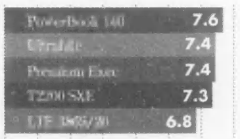
(Detailed ratings on next page)

User importance rating:

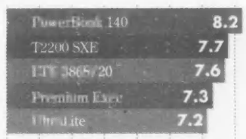
9.1 Compatibility with current software



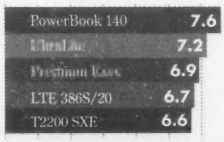
8.6 Value for the dollar



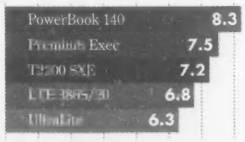
8.4 Durability and ruggedness



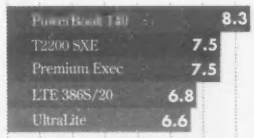
8.4 Screen readability



8.3 Responsiveness of vendor service



8.1 Quality of vendor support



RATINGS IN ORDER OF IMPORTANCE

(Notebook PCs, continued from previous page)

The PowerBook 140 finishes first or tied for first in all remaining categories. Each of the other notebooks manages at least one second-place and one last-place result.

8.0 Processing performance

PowerBook 140	7.9
T2200SXE	7.7
LTE 386S/20	7.6
UltraLite	7.5
Premium Exec	7.3

7.8 Adequate battery life

PowerBook 140	7.1
LTE 386S/20	7.0
UltraLite	6.4
T2200SXE	6.2
Premium Exec	5.8

6.8 Variety of peripherals available

LTE 386S/20	7.2
PowerBook 140	7.2
Premium Exec	6.9
T2200SXE	6.9
UltraLite	6.8

8.0 Hard disk performance

PowerBook 140	8.0
T2200SXE	7.7
LTE 386S/20	7.5
Premium Exec	7.3
UltraLite	7.0

7.7 Ease of maintenance

Premium Exec	7.4
PowerBook 140	7.4
LTE 386S/20	7.1
T2200SXE	6.9
UltraLite	6.6

6.8 Expansion options

PowerBook 140	7.0
LTE 386S/20	6.9
UltraLite	6.6
T2200SXE	6.6
Premium Exec	6.4

8.0 Portability; size and weight of system

PowerBook 140	8.6
UltraLite	8.2
T2200SXE	7.9
Premium Exec	7.9
LTE 386S/20	7.8

7.9 Keyboard ease of use

PowerBook 140	8.2
T2200SXE	7.4
UltraLite	7.1
Premium Exec	7.0
LTE 386S/20	6.3

7.4 Networking capability

PowerBook 140	8.0
LTE 386S/20	6.8
UltraLite	6.7
T2200SXE	6.5
Premium Exec	6.4

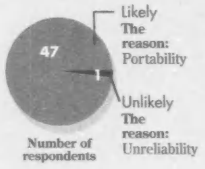
6.3 Security features

PowerBook 140	6.9
LTE 386S/20	6.3
Premium Exec	6.2
UltraLite	6.0
T2200SXE	5.7

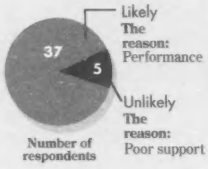
Loyalties

Would you buy the product again?
(Reasons are based on most frequently stated answer)

PowerBook 140
Responses: 48

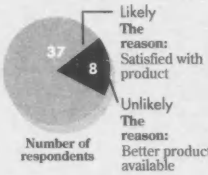


T2200SXE
Responses: 42

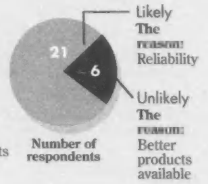


Premium Exec
Responses: 42

LTE 386S/20
Responses: 45



UltraLite
Responses: 27



Verbatim

What do you like best/least about this product?
(Responses are based on most frequently stated answer. Quotes are selected from user responses.)

PowerBook 140

Likes

Portability
"It's a no-compromise Macintosh IICI in a small box."

Dislikes

Display quality
"The screen refresh rate could be better — sometimes you lose the cursor."

T2200SXE

Likes

Light weight
"The low weight and small size make it easy to take in the field."

Dislikes

Cost
"It is definitely priced too high."

Premium Exec

Likes

Price
"We're very pleased with their price/performance ratio."

Dislikes

Display quality
"The screen could be clearer — we've had complaints about readability."

LTE 386S/20

Likes

Processing speed
"It's small enough, and it is a great performer."

Dislikes

Keyboard
"The keyboard isn't laid out well, and it doesn't feel like you're typing."

UltraLite

Likes

Portability
"Size and weight relative to power and functions is excellent."

Dislikes

Display quality
"The screen is not clear enough."

Vital statistics

Total number of respondents: 204

What is your position?

IS director	36
IS manager	38
PC manager	23
PC technical support staff	49
End user	24
Other	34

How many notebook computers is your company using?

1-10	88
11-50	64
51-100	6
101-200	19
201-500	11
More than 500	9
Don't know	7

METHODOLOGY

The products included in the Buyers' Scorecard survey are market share leaders among notebook computers.

User names were provided by nonvendor sources. First Market Research in Austin, Texas, conducted the telephone survey and tabulated the results.

Features users would like to see added or improved in notebook personal computers include better screen readability, color display, longer battery life, larger hard drives and improved networking capability.

To compute the overall score for each product, perform the following steps: 1) Multiply the product's score in the first category by the user importance rating for that category to obtain the weighted score. 2) Repeat the process for each ratings area. 3) Average the resulting figures for the average weighted score. 4) Convert the average weighted score to base 100.

The ratio of the average weighted score to the average user importance rating is equal to the ratio of the overall score to 10. Numbers are rounded off where necessary.

ACKNOWLEDGMENTS

Computerworld thanks the following individual and companies for assistance in preparing this Buyers' Scorecard: Mike Kelly, Techtel Corp.; *Computerworld* Database Division.

Nightmare Scenario #2

THE RUNAWAY CASH SUCKER.

VINES® now available for 5, 10, or 20 users!

"Why didn't someone tell me this @$!?& network would cost so much?"

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The fact is, the real economics of running a computer network are never even mentioned by the people trying to sell you one.

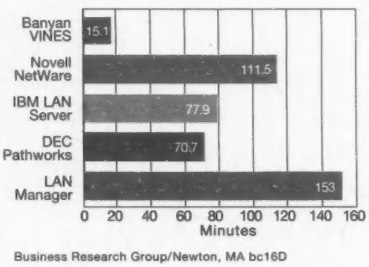
And not knowing can cost you plenty.

Research proves Banyan more cost-effective than Novell, IBM, DEC and Microsoft.

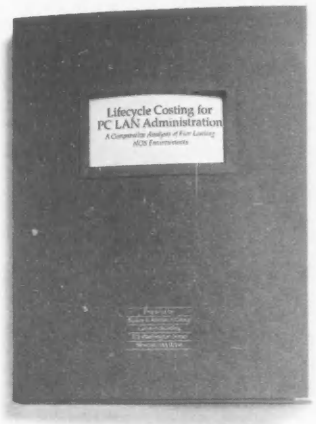
Which brings us to the research report offered free on this page.

It was compiled by the Business Research Group, and shows how Banyan,® Novell,® IBM,® DEC,® and Microsoft® stack up against each other in cost of operation.

What BRG did was to interview the day-to-day LAN managers at 180 different organizations about the length of time required to execute 11 typical network functions.



For sheer cost-effectiveness, Banyan surpasses everyone.



Send for this impartial survey of network cost-efficiency. It's full of hard, actionable data.

Banyan won in all 11 categories. Often by astounding margins.

Whatever the job, administrators of Banyan VINES® networks were able to do them faster.

And faster translates into smaller staffs and lower cash outlays.

Banyan won across the board because our unique integrated architecture greatly simplifies administration. With Banyan VINES, cost-efficiency is built in from the beginning.

Computer networks are rapidly becoming indispensable to business. So understanding the true cost of networking is now critical.

The BRG report is a good place to start. This is a real-world report based on the testimony of actual network managers.

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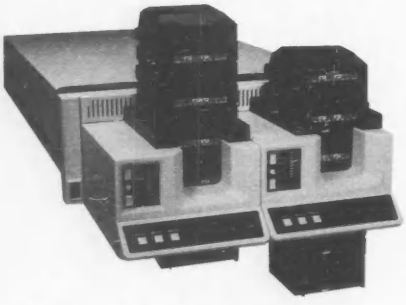
For all the exciting technological advances made in the IBM midrange computing environment in the last five years, there has been almost no change in the way data is stored. Until now.

Today, XL/Datacomp offers more choices for cost-effective data storage on disk and tape than ever before available



to the IBM AS/400 user. These choices include 18-track cartridge, 8-mm cartridge and reel-to-reel tape subsystems that make back-up both easy and cost-effective. Our new 9336 compatible DASD subsystems offer levels of performance and reliability never before available to the AS/400 user. Each features optional hot-spare technology for data protection and cache technology for high performance.

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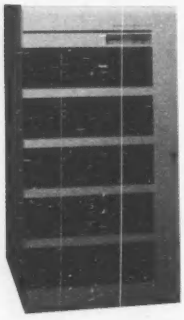
We've just released the Alpine 9600 Storage Manager™, a fault-tolerant, disk-array subsystem that is the first AS/400



storage device to provide continuous operation through redundant components and RAID 5 (Redundant Array of Independent Disk) architecture.

Alpine sets a new standard in data availability and protection. All components are hot-pluggable and may be replaced without disrupting operations.

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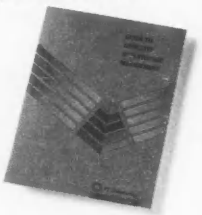

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Knowledge loom of the '90s

An inquiry center uses technology to weave together marketplace information for effective decision-making

BY VINCENT P. BARABBA AND GERALD ZALTMAN

More than ever before, companies must listen to and correctly interpret the voice of the market — that is, what customers want and are willing to pay for. Using the voice of the market goes far beyond the simple acquisition of data. It requires that data be integrated into the decision process, which determines what an organization is capable of and willing to provide to the market. These decisions represent, in effect, the voice of the firm.

A market-based firm is created when decision-making throughout the company is based on the reconciliation of differences between the two voices. Spending money to develop ideas originating largely within the firm and later learning that customers are unlikely to pay for them is a gross misuse of research and development and market research resources.

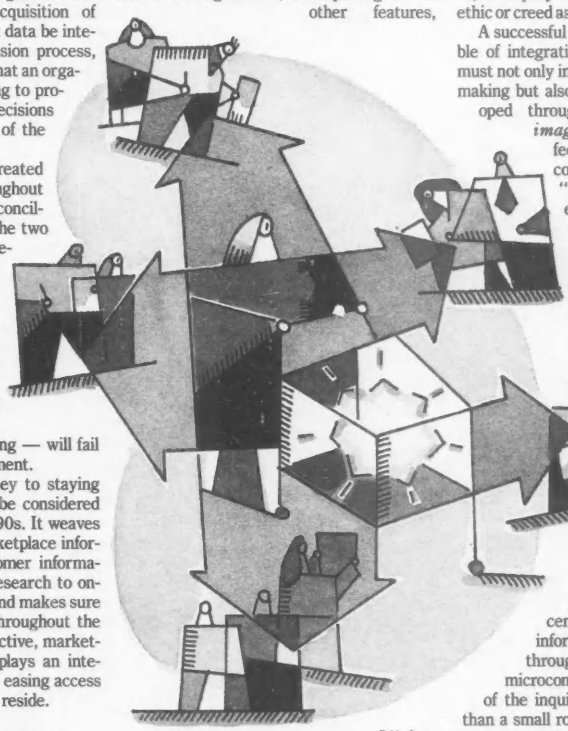
Firms that lose touch with the market — that either ignore or misinterpret its meaning — will fail in today's competitive environment.

An inquiry center is the key to staying close to the market and can be considered the knowledge loom of the 1990s. It weaves together various types of marketplace information (from rumors to customer information to sales data to market research to online news services and so on) and makes sure they are available and used throughout the company for making more effective, market-based decisions. Technology plays an integral role in the inquiry center, easing access to information wherever it may reside.

Zaltman is the Joseph C. Wilson professor of business administration at the Harvard Graduate School of Business in Cambridge, Mass. Barabba is executive in charge of the Market Research Decision Center at General Motors Corp. in Detroit. This article is based on their book *Hearing the Voice of the Market: Competitive Advantage through Creative Use of Market Information* (Copyright 1991 by Harvard Business School Press).

Companies such as General Motors Corp. are experimenting with the inquiry center concept to minimize the discrepancy that often exists between market information and products (see story page 136).

For example, GM might find that the market indicates that customers prefer a V8 engine in a particular GM vehicle. But GM may have a V6 engine that, when packaged with other features, would better meet overall customer requirements.



Robin Jareaux

Before GM can make the decision, it must synthesize various information pieces to understand why the customer prefers a V8: Can GM convince the customers that the V6 will meet their requirements? What is more important to the customer — the V8 or other attributes that GM can provide with the V6? The inquiry center helps in that synthesis.

Specific functions that facilitate both formal and informal learning, such as market research, competitor intelligence staffs and economic planning departments, are often thought of as formal inquiry centers. However, an inquiry center is as much an attitude, ethic or creed as it is a formal entity.

A successful inquiry center must be capable of integrating multiple perspectives. It must not only integrate the *logic* of decision-making but also draw on the *energy*, developed through collaboration, and the *imagination* of those who will affect, or be affected by, the outcome of decisions. It is the "area" where information users and providers work together in an environment conducive to the effective interplay of logical analysis, consensus building and creativity and innovation.

The center will have within it the various databases, meeting facilitating tools, processing equipment and human resources that enable information users to function best within the three dimensions of logic, energy/collaboration and imagination.

"Within it," however, does not necessarily imply a central physical facility. Because information can be networked through decentralized, easy-to-use microcomputers or terminals, the core of the inquiry center need be no larger than a small room containing a central storage and switching facility.

Important communications often happen on an informal level in an organization. The inquiry center must be designated to facilitate informal communications among those wishing to ask questions, test assumptions or share information.

What the inquiry center needs most of all,

Continued on page 136

• Synthesizing logic, collaboration, creativity

• The technologies that make it happen

• A peek at GM's inquiry center

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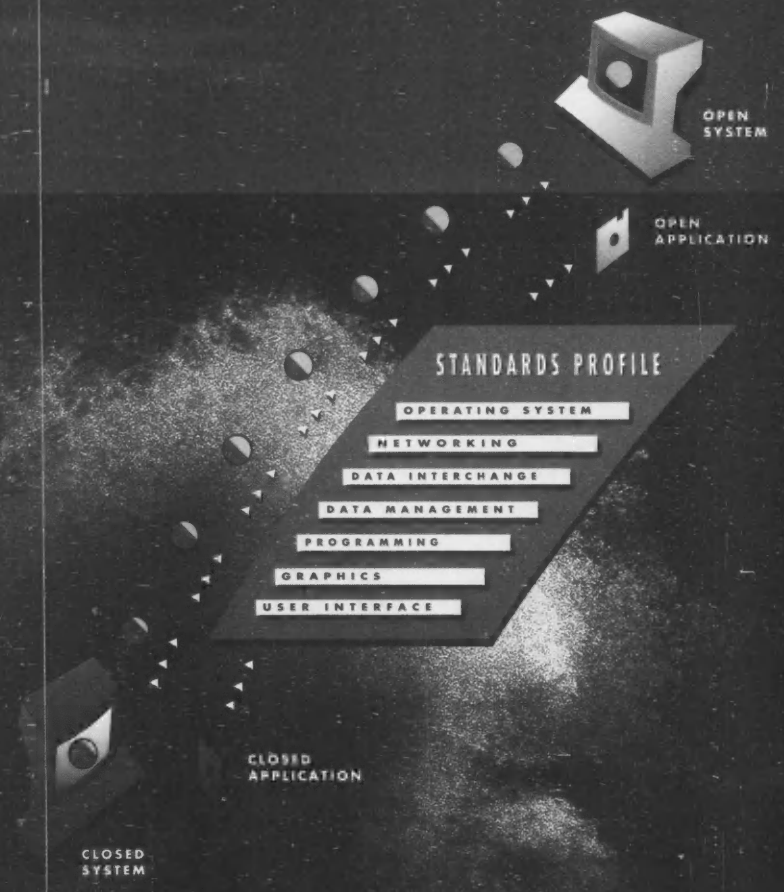

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Continued from page 133

however, is a supportive environment: explicit sponsorship by senior management, recognition and reward for use of new tools, skillful facilitation and assurance that good ideas are implemented.

Home: Where the tools are

In essence, then, the inquiry center is the home for the tools (physical and human) operating within a three-dimensional space. It is an area where all the functions of a support system can be bundled during the decision process. Furthermore, the inquiry center should offer a relaxed atmosphere in a variety of geographical settings. It will be a place where it's OK for people at all levels of an organization to experiment and to risk being wrong.

It is an open space for ideas, innovation and learning. Indeed, it could be called an idea center, a creativity center, a decision center or even a learning center. It is a place where individuals can learn efficient and effective approaches to decision-making. Here is where they can learn about the needed level of support information, about the risk of alternative decisions, about the aspects of successful implementation and how alternatives are compatible with, or affect, current strategy.

Perhaps most importantly, the inquiry center should not be "owned" by an organization such as the market research group or the information systems group. Rather, it should be owned by the people in the organization who must develop innovative ideas and solve problems. It should be their inquiry center — and it will likely take a different shape each time people participate in a collective effort to solve a particularly complex problem.

But the inquiry center is not just an abstract concept for solving organizational problems. It is also a practical approach to integrating logic, energy and imagination into the decision-making process. The more fully these dimensions are explored, the more it appears that the line between what is possible and what is not lies mostly in the way we think about the center's potential. •

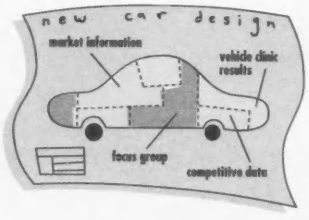
Carmaker shifts into high gear with informal inquiry center

General Motors has implemented the inquiry center concept (though not a formal organization) on two projects — one in design and one in quality.

For GM design staff.

GM has under development the design of an inquiry center for its design staff. It is a test of the ability of the inquiry center concept to bridge the gap among the many different worlds of market information users.

This inquiry center operates in the world of the studio designer, whose mission it is to come up with vehicle concepts that transcend those that already exist. The design staff inquiry center is being developed to serve the market information needs of vehicle designers, design staff strategic planners and the librarians at the design staff library.



The inquiry center can be developed in three steps. This process will begin in the Advance Studio, where GM is currently applying advanced computer technology to the design process. This experience will be used as the basis for deciding whether to expand direct links to all studios.

By starting in the Advance Studio, GM is attempting to take advantage of an environment that is especially suited to deal with electronic innovations to the design process, with particular emphasis on these innovations' impact on the studio designer. This application offers the opportunity to bring several benefits to the design staff by combining computer screen graphics with still or motion video to present data in a high-impact visual form.

Here is the order of events:

Step 1. Develop a planning presentation system to be used by the design staff's strategic planning department to ensure that market information will be presented in a form familiar to designers. This initial effort will allow the strategic planning department to become familiar with the approach and the processing equipment being developed.

Step 2. Fully develop a design staff library inquiry center for designers who have to use support personnel to access market information. Within the library, the inquiry center will be used to store and present market information, vehicle clinic results, focus group videotapes and competitive data.

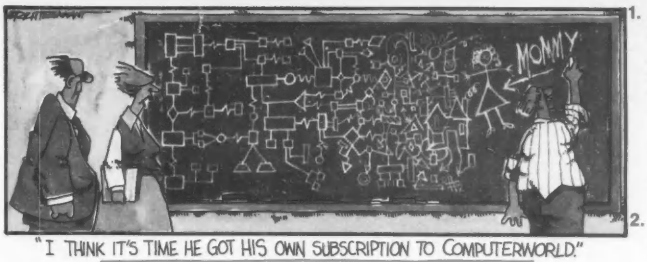
Step 3. Assuming acceptance by studio designers of the inquiry center library application, provide each of the design staff's several studios with a direct link to a centralized inquiry database.

GM's quality function deployment.

GM's market research department and systems engineering center are applying the inquiry center concept to quality function deployment for use by the advanced engineering and manufacturing organizations and their product program managers. The goal is to minimize the discrepancy that exists between market information and product specs.

The market research group has the lead role in data management: collecting, storing and retrieving information and presenting it. It gathers customer requirements, the relative importance of those requirements and customer competitive evaluations and does so with extensive product team participation.

The product team uses this information, enhanced by its experience and knowledge, to translate customer desires into product characteristics. The market research group assists the product team to ensure the most accurate translation.



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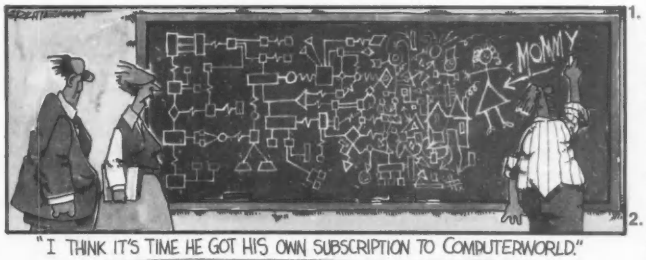

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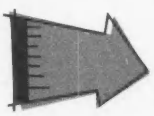
The right technical ingredients

Technologies such as E-mail, GUIs, interactive video form the basis of an inquiry center

BY VINCENT P. BARABBA AND GERALD ZALTMAN

Technology is an integral part of the inquiry center concept in that it eases access to information and augments the decision-making process by bringing data, information, intelligence, knowledge and wisdom to a user's fingertips. It helps an organization become market-driven.

Most of the technologies that bring the inquiry center to life have a central theme in common: They are all people-involving. They were designed with the user in mind. The following technologies enable users to function well in the three key dimensions of an inquiry center — the logic of decision-making, energy/collaboration and imagination/creativity:



Technologies for the logic dimension. Here are the inquiry center technologies that help users manipulate and use logic to make market-driven decisions:

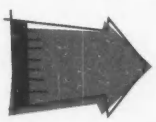
▶Spreadsheets. Spreadsheets are immensely popular because they appeal directly to the logic dimension and allow the nonexpert to apply complex statistical and mathematical treatment to a given set of numerical data.

▶Graphing programs. Graphing programs are, for all intents and purposes, natural extensions of the spreadsheet concept. After all, graphs give the power of visual interpretation to the otherwise overwhelming chaos of numbers on a spreadsheet.

▶Databases. Databases of customer and organizational data form the information foundation upon which many inquiry centers are built. Databases come primarily in two organizational flavors: hierarchical and relational.

In the hierarchical model, data is organized first by category and then by subcategory and so on in an ever-widening pyramid-shaped structure. The level of detail increases, moving from top to bottom.

Unlike the hierarchical model, the relational model groups similarly structured data into a table similar to a spreadsheet, and tables of related information are kept in the same database. By using a series of "logical operators" (and, or, nor, not), one can construct a parts list for each automobile from this compact structure.



Technologies for energy/collaboration. Creating more of a sense of community among users is the current direction in computer-based communications. The most productive technologies are those that enable users to get information of interest and value to them without having to know it is out there. Here are the technologies that facilitate the energy/collaboration dimension of an inquiry center:

▶Bulletin board systems. Bulletin board systems have been the backbone of online communication among computer users. Individual bulletin board systems usually revolve around either one or a select set of topics, with users forming a sort of special interest group around a topic. All other subjects are taboo.

Bulletin board systems have a special significance for the collaborative dimension of the inquiry center. Organizations with electronic-mail systems can quickly set up a series of special interest groups for the discussion of hot topics or topics of ongoing concern. The topics are clearly defined, as are the goals of the discussion.

Thus, for those interested, the systems eliminate the need to get on the right distribution list to get information. All mail that pertains to a specific topic can be put onto the proper bulletin board, where it can easily be found by someone scanning a list of special interest group topics. In the short term, special interest groups are clearly a low-cost answer for gathering specific information.

However, as time progresses and people post ever-increasing amounts and types of information on bulletin boards, their functionality deteriorates. A balance is needed between how broadly a topic for a special interest group is defined and how many people must wade through to find the information that interests them and will help them make wise decisions. In other words, the more narrowly defined the topic of a specific bulletin board, the higher its value to the user.

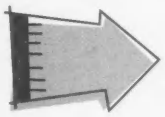
As the number of types and the amount of information grows, either the number of topics will have to increase or each set of topics will have to be broadened. A list of more than 30 to 50 topics tends to frustrate the user, as does an individual topic that contains a large portion of useless information.

▶Intelligent E-mail systems. The solution to the problems of bulletin board systems can be found in an intelligent E-mail system. Such a system allows the user to define a set of topics, words or phrases that are of special interest to him.

Whenever mail is sent out, the system invokes user-defined filters to see who gets what. If any word in the filter matches a word in the message, it is sent to the user's private mailbox. Users do not have to wade through voluminous topic lists or overpopulated topics looking for information. Mail senders no longer have to figure out which topic to use; the computer does it all.

The drawback to both systems is that different people in different areas of a company will often view and refer to the same concept in different ways. Disparity in a common piece of information such as a client's name can make it impossible to collect all records on that client.

To overcome the pseudo-language barriers found in a multicommunity environment, organizations can use a simple database of synonyms. Synonyms intercede every time a user makes a request to find data. For example, a company that wants all information pertaining to the colors of its products might issue a search of its data — something like: "Find all where description = 'color.' " Without a synonym database, such a simple search might turn up nothing if, for example, it were performed by the British office of the same company, where "color" might be spelled "colour."



Technologies for imagination/creativity. The technologies that provide for the energy/collaboration dimension of the inquiry center offer only minimal support for the imagination/creativity dimension. All too often people are told to be creative in environments that breed conformity.

The first step in facilitating imagination and creativity is to provide users with a conducive, easy-to-use environment. The following are technologies that enable users to focus their imagination and creativity on using market information well:

▶Graphical user interfaces (GUI). In the GUI environment, in which commands are issued through symbols, not by command line, human intuition can take over. Users are free to spend more time doing what they want to do instead of trying to figure out how to do it.

In the large systems world, in which symbol interfaces have yet to make inroads, computing responsibilities can be divided between mainframe and desktop. A personal computer would be used at the front end and would deal with the user-interface issues. The mainframe would handle back-end tasks such as number crunching or large-database queries.

Through products that facilitate this division of labor, the user can fully incorporate the output of the mainframes into PC applications such as word processors and spreadsheets for further analysis and presentation.

Also, by using the PC as a front end, users have to learn only one interface, through which they can access many systems. Allowing users to easily bring together disparate data greatly improves creativity.

▶Multiprogramming. Multiprogramming is the ability to actively run more than one piece of software at a given time, a concept closely related to the idea of bringing together disparate data. Multiprogramming systems are necessary if the user is going to analyze different types of data simultaneously.

Consider a situation in which a manager is making a case for a new product program. In one window on the screen there might be a word processor running the contents of the final report. In another window, a spreadsheet might be running a forecasting model for the product's revenue potential during the coming years. In the third window, there might be the contents of a competitive analysis of products in the same market, gleaned from a mainframe database. Finally, in the fourth window, there might be data from a news retrieval service with up-to-date progress of a congressional regulatory bill that could have a detrimental effect on the sales of the product.

Data can be exchanged between windows by simply selecting the data with the pointer, using a command to cut the data, positioning the pointer in the desired destination window and using a command to paste the data. For example, the user might want to add a copy of the regulatory bill text to his final product proposal.

▶Hypertext linking. Multiprogramming systems bring together different forms of data on the fly. But this approach can go one step further by embedding these links in systems so they can be recalled for viewing or editing later. This is where hypertext linking comes into play.

In a hypertext environment, text, or even objects (such as graphics), can be linked to other text or objects that have something in common or that provide more detail.

Imagine a brochure for a new automobile. In a hypertext environment, the introductory screen might contain just a picture of the car. To get more information on a specific aspect of the car — say, the interior or the radio — the user would point and click on that region. The user could also click on any words accompanying the images for more information.

This is much quicker than searching the database for the location of that data. It is also more flexible than most traditional systems in which one must follow a linear path to a destination (the information needed), usually within the constraints of a tree-structured hierarchy.

▶Interactive video. Most data is flat: It lacks emotion and perception. While in many cases this is the desired norm, it is quite the opposite when the data needed deals with the voice of the market (i.e., what customers want).

Much of the voice of the market is communicated by the image customers project of themselves (i.e., the kind of car they drive, the neighborhood they live in, the clothes they wear and so forth). Normal row/column data either falls short of communicating such dimensions or is inappropriate for some users. For example, cross-tabs may be what a market analyst user needs but may be scorned by a designer, who wants a more visually oriented presentation.

It is for the designer that interactive video may find its first use, but its use will not stop there. Market analysts in the inquiry center might find that interactive video enables them to get closer to the customer whose needs they are trying to address.

Without the visual dimension, the customer is a series of numbers and summary statements that are not easy to understand. In the realm of the inquiry center, one must understand data in a truly holistic sense. This is almost impossible when the visual dimension is absent. •

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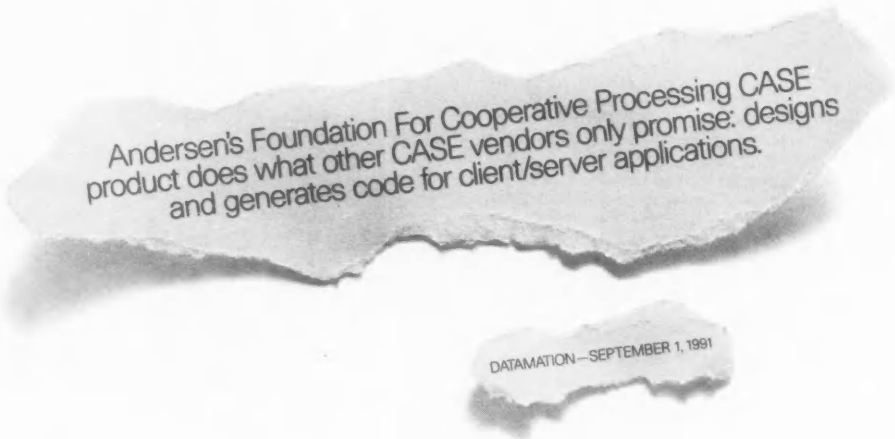
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MANAGER'S JOURNAL

EXECUTIVE TRACK

As part of an overall corporate reorganization, Bartlesville, Okla.-based **Phillips Petroleum Corp.** recently promoted its highest information services job from a managerial to a top executive post.

Manning the new post is executive vice president and board member **Charles L. Bowerman**, who is charged with general oversight of all information systems activities at the $12 billion oil company.

P.J. Gottardi, who served as effective chief information officer before the realignment, now heads up application services at Phillips. He reports to Bowerman, along with **D. E. Colmenares**, head of the firm's central computing center; **K. L. Adams**, network services head; and **R.D. Gooley**, business technology development head.

Joe Perno, former information systems director at Xerox Corp. subsidiary Crum & Forster Insurance, is the new personal line manager of IS at Warren, N.J.-based insurance firm **Chubb & Son, Inc.**

Mitchell Weisberg has joined **Arthur D. Little, Inc.** as a director of management consulting specializing in information management issues. A veteran of the IS and consulting industries, Weisberg comes to the Cambridge, Mass.-based firm having served most recently as managing director of the Australia Branch of Nolan, Norton & Co.

At his new post, he will develop information-driven strategies for business, align technology investments to business strategy and apply information technology to reengineer business processes.

Donald A. Marchand, IS professor and dean of the School of Information Studies at Syracuse University, was recently elected vice president/international for the **Society of Information Management**. Marchand's term begins next month and runs through June 30, 1993.

Get out there and innovate!

Order-taker mode no longer cuts it in IS departments

BY JOANIE M. WEXLER
CW STAFF

The "we listen to users" credo alone will not sustain information services professionals throughout the decade. In fact, when it comes to technology-enabled corporate strategies, the information systems leader who wants to retain — or gain — a vital role within the company had better learn to be a pitcher as well as a catcher.

So says at least one consultancy urging IS departments to take a more active role in initiating new business services. And many IS directors agree.

Paul Lethbridge, a vice president at Surrey, England-based Inteco Co. and author of a report on operational uses of information technology published this month, says that to plough beyond the current blizzard of pink slips and static budgets, IS leaders must broaden their responsibilities and recast themselves as change agents.

Survival of the fittest

Reducing administrative costs and reacting to stated user needs is necessary — but no longer sufficient, Lethbridge says. IS survival, he suggests, also hinges on drumming up revenue-generating, technology-based business process changes and selling them to executive management.

The IS manager's mandate to innovate is already being carried out at companies such as General Electric Co., Eastman Kodak Co., J.P. Morgan & Co. and Progressive Insurance Co. — each of which has an IS delegate on the senior management team, notes Richard W. Swanborg, an associate at Ernst & Young's Center for Information Technology and Strategy in Boston. The concept is also starting to trickle down to such firms as JC Penney Co. and Burlington Coat Factory Warehouse Corp.

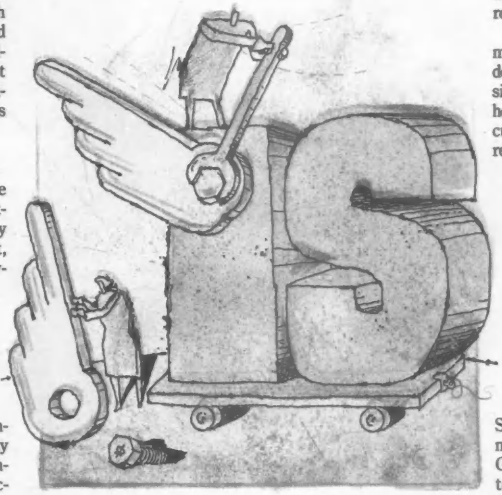
"The movement [to change business processes] in the retail industry is being driven largely by the MIS guys," says David Evans, vice president and director of IS at JC Penney in Dallas.

For example, Evans cites JC Penney's recent $200 million replacement of 42,000 electronic cash registers with networked point-of-sale (POS) systems for marketing and reorder analysis: a sweeping change in business procedure that was proposed to executive management by IS.

In addition, Evans says, it was IS that persuaded JC Penney's senior management to overhaul the supply cycle among the firm and its suppliers through electronic data interchange (EDI) and other mechanisms.

Lethbridge cites both POS and EDI implementations as examples of passive projects that have turned active at many companies. POS installations, for example, "started out as vehicles for managing inventory, then turned into a demographics-generating marketing tool" that can be used to rake in revenue, he explains.

"We're not setting the direction of the company," Evans notes. "But it is the responsibility of the chief information officer to understand how information technology can be used to magnify the strengths of his particular business and industry, then propose [changes] and get agreement among the rest of corporate management."



David Freedman

The IS director at the Burlington Coat Factory goes a step further. "I feel I influence the way the company operates," says Michael Prince, IS chief at the $1 billion, Burlington, N.J.-based firm. According to Prince, his group was largely the impetus for a shift in distribution procedures from a drop-ship-oriented strategy to funneling most shipments through a Burlington distribution center.

Wireless wins out

At Nooter Construction Co. in St. Louis, IS director Bill Posner has decided that wireless local-area networks could tie more job sites onto the corporate network.

"If there is a change order during construction, this would give planners faster information on how to make adjustments," he explains.

By minimizing work unknowingly performed out of specification with the new plan, Posner says, the tie-in should end up generating revenue for the company.

But the IS-as-innovator mind-set that has gripped Posner, Prince and their ilk is far from entrenched: IS departments are still largely in reactive mode, Inteco notes. Lethbridge says that despite the years-old hype of IS managers wearing business manager hats, "MIS still doesn't understand the business. They get admitted to the boardroom, then get kicked out." He estimates that just 16% to 20% of commercial IS expenditures today generate revenue.

Bill Conley, manager of IS services at Loral Aerospace Corp. in Newport Beach, Calif., thinks he knows part of the reason.

"The methodology of making user wish lists and doing joint-application design did us a disservice," he says. "It caused us to focus on generating lists of requirements and remaining in order-taker mode rather than structuring an approach for improving business processes."

All caught up

IS managers in firms without the organizational support structure for empowering IS can find themselves in a bind. For example, Tom Schoeve, director of information services at Enron Gas Services Co. in Houston, says that in his firm, IS "exists only to generate revenue." But he recalls hitting a brick wall when — in his previous capacity as Enron's IBM sales representative — he tried to sell the concept of innovation to IS managers at large corporate shops "before it was fashionable."

According to Schoeve, innovation is a hard sell at mainframe-centric IS shops because staff members are reluctant to venture into new, possibly daunting territory. The training of glass-house professionals "has been traditionally reactive," he says. "It's not in their skill set to innovate."

Conley agrees. However, he says he believes that the influx of client/server architectures could in some ways be instrumental in helping IS managers meet the innovation challenge.

Modular client/server architectures allow IS to make changes to existing processes in more granular pieces, he notes, thereby skirting the risk of overhauling huge system and application investments at once.

National IS overhaul eyed

BY THOMAS HOFFMAN
CW STAFF

NEW YORK — Will technology strategies brewed in the cauldron of large corporate information systems shops spike U.S. competitiveness? Veteran IS management consultant John Diebold thinks they will.

According to Diebold, the development of an automated national health care information system could result in immense savings for health care providers and insurance carriers — and ultimately for patients.

An integrated network of health care providers and insurers, geared to transmit medical information on any U.S. citizen among all health care agencies, could enable the industry to virtually eliminate the need for duplicate medical testing and unnecessary procedures, Diebold said. He pegged the annual nonadministrative savings at $60 billion, or 10% of the annual nonadministrative health care market.

That scenario is among the fruits of ongoing research at The Diebold Institute for Public Policy Studies, Inc., a nonprofit foundation that conducts studies aimed at spurring the nation's growth and honing its competitiveness. Diebold, who heads the institute he founded in 1968, said such a system could cut the nation's health care administration costs by some 25%, yielding savings in the neighborhood of $30 billion per year.

Part of this could be achieved by allowing patients to administer simple procedures at home and send the results to a laboratory, said Philip Aspden, associate director of The Diebold Institute.

However, Aspden conceded that the current infrastructure for such a national information system is weak. "This is not going to happen overnight," he said.

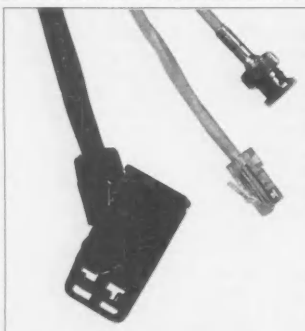
Nevertheless the study, which was funded by the Alfred Sloan Foundation, concluded that community-based information utilities for the health care industry are expected to be in place for testing within the next four years.

A similar study was conducted to focus on yet another infrastructure expected to be impacted by information technology in the next few years: America's highways. Sigmund Silber, a consultant at The Diebold Institute, said he expects initial field trials of advanced traffic management and traveler information systems by 1996.

Silber projected that intelligent vehicle highway systems (IVHS) will be in widespread use in the U.S. within a few years at an approximate cost of $1,000 per vehicle. However, he added, it is unclear whether consumers, car manufacturers or the federal government will foot the bill.

Moreover, a pile of public policy obstacles lies between conceptualization and implementation of complex national IS systems, Silber said.

"Many transportation executives think that IVHS will be free and must be universal," Silber noted. If so, he added, "The cost will be passed on to taxpayers, who might not want to pay for this."



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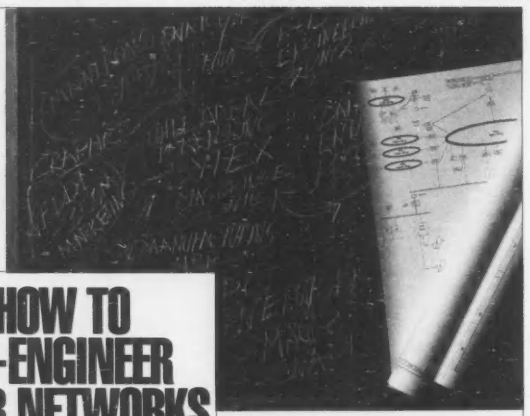

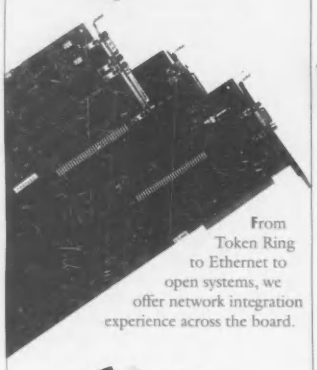

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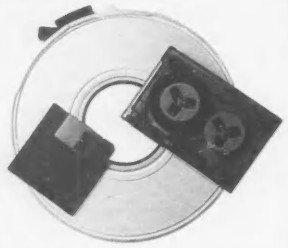

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Amoco readies downsizing plan

BY ELLIS BOOKER
CW STAFF

CHICAGO — Amoco Corp.'s information systems group, like other departments at the $28 billion energy company, is carefully reviewing its staffing levels, operating costs and current projects.

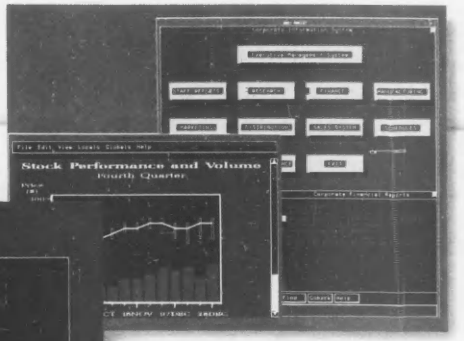
Spurred by a 39% earnings decline last year and first-quarter earnings down 52% from those logged in last year's comparable quarter, Amoco is developing a major cost-cutting plan to be announced later this summer.

Two weeks ago, Amoco Chairman H. Laurance Fuller said the company would make a 12% reduction in its capital budget — from $3.7 billion to $3.3 billion — and evaluate selling some company assets or divesting some operations. Layoffs in the firm's 50,000-person work force are also "inevitable" as part of the cost-cutting campaign, Fuller said.

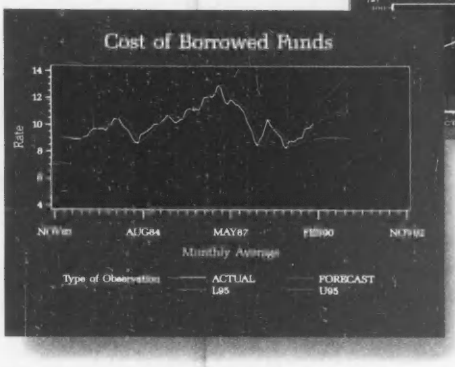
Details of how this will affect the more than 1,000 jobs in the corporate IS group have not been announced. But insiders noted that Amoco has already trimmed its IS ranks over the past two years — most recently with a 5% reduction through an early retirement program in February.

Last year, Amoco halved its number of data centers, closing facilities in Chicago, New Orleans and Denver. During the past 18 months, about one-third of the IS employees have been redeployed to Amoco's three main operating companies — oil and gas exploration, chemical and production — where they have taken over responsibility for application development.

Executive



Finance



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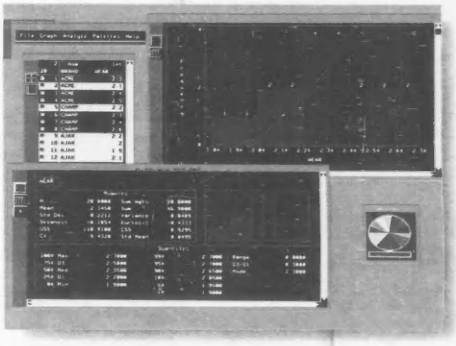

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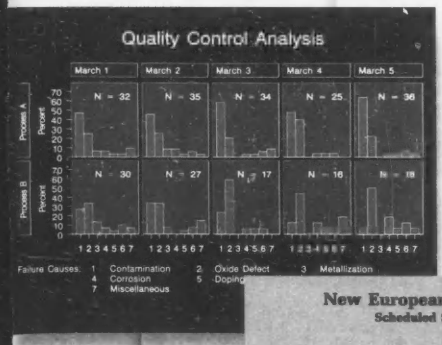

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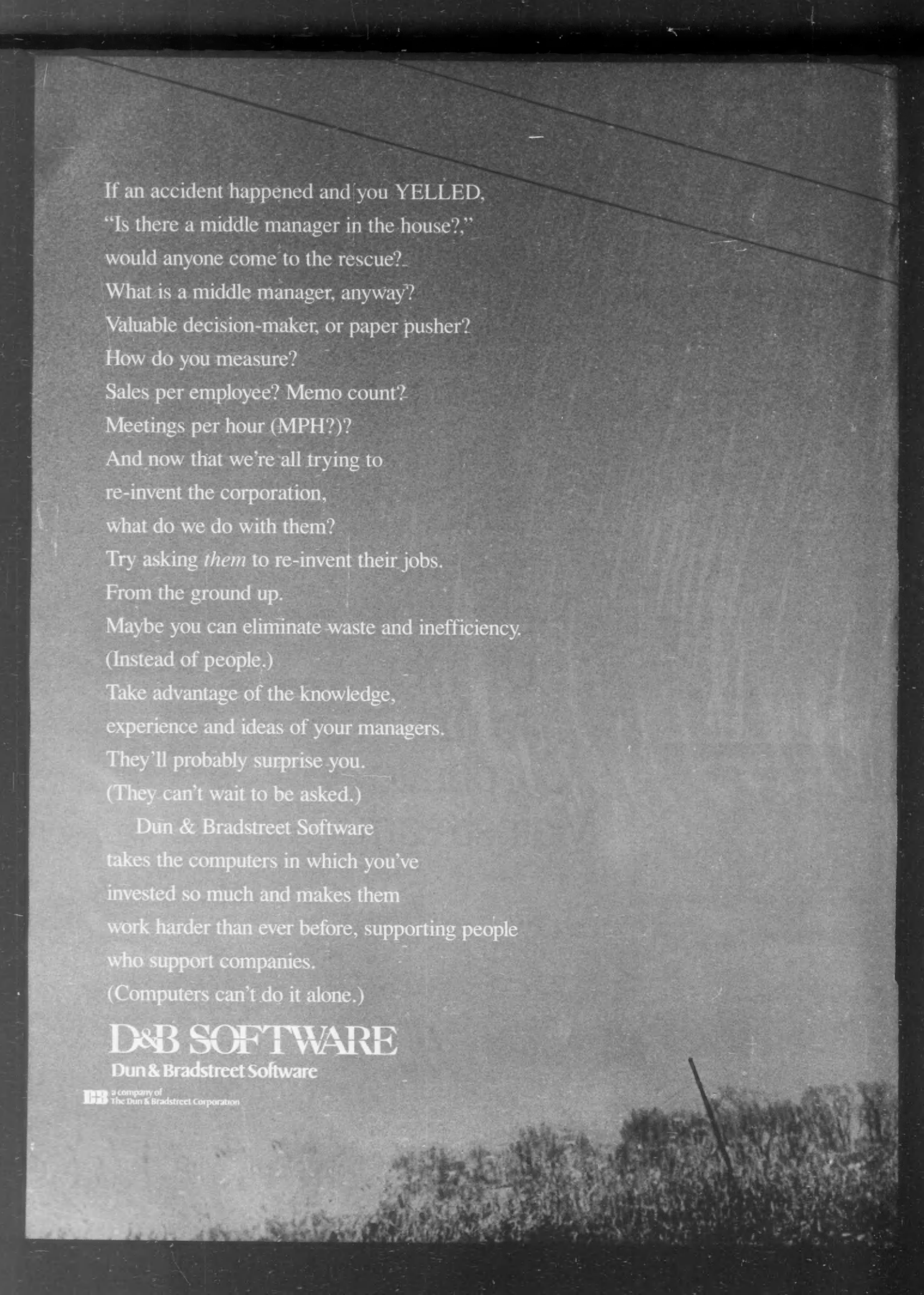
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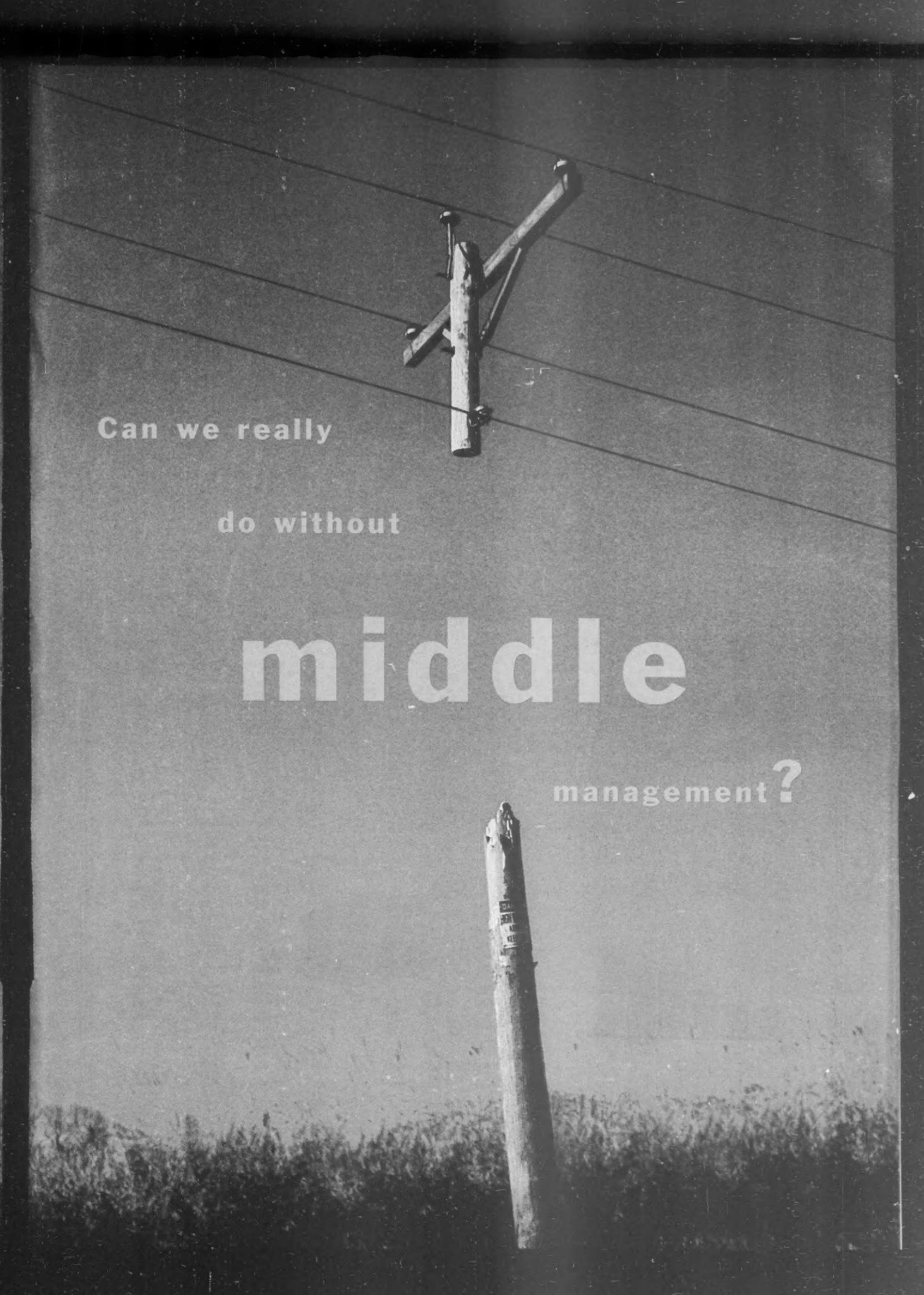
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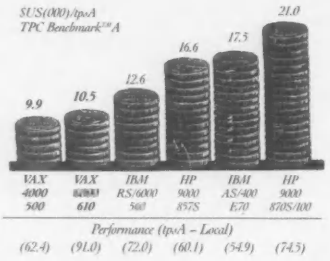

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Systems developers key on speed

BY NELL MARGOLIS
CW STAFF

CAMBRIDGE, Mass. — Speed and efficiency led the key issues lineup last week as management consulting firm CSC Index, Inc. released its third annual survey of systems development directors.

No surprise, CSC Index Chairman and Chief Executive Officer James A. Champy said, noting that developers seem poised to supply exactly what their firms' top management demands.

"The message I hear from CEOs is deceptively simple: Get systems built and implemented," Champy noted. "The emphasis is first on speed, then on budget."

Champy is hearing the message as it is, according to Leif Haslund, assistant vice president of administrative services at Alaska Airlines in Seattle. "It seems to me that what management really wants is quality, understanding of the business problems that have to be addressed and accountability," noted the 29-year IS veteran. "They could care less what we use for tools, as long as we deliver."

But even as he praised the back-to-basics bent reflected in this year's survey responses (see chart), Champy also warned that developers with their noses glued to the grindstone may not have their eyes on the prize. And make no mistake about it: Failure to anticipate and act on tomorrow's issues, just as surely as failure to address those mounting today, could be disastrous to the health of the systems development shop. "CEOs may want speed today," he noted, "but tomorrow they'll need something else in addition to speed."

The word for developers who can act like implementers while thinking like strategists, CSC Index Vice President Nicholas Vitari said, is not "superman"; it is "survivor."

"If development organizations continue to view their job as a technology job, macro events will render such units obsolete," he noted. "If they view the long-term development strategy to be simply moving to client/server architectures and object-oriented methods, then the long-term strategy of the business will suffer. Firms will be forced to search elsewhere for the core competencies they expected to find in-house."

CSC Index surveyed 216 systems development executives — 162 in North America and 54 in Europe — culled from a broad range of service and manufacturing industries.

Analysts red-flagged a striking contradiction in the U.S.-based responses: "Demonstrating the value of development projects to senior executives" rose to sixth on the list of critical issues facing developers this year, up from No. 8 last year and No. 11 in 1990. However, developing and implementing metrics — an approach hailed by consultants as apt to yield the tangible evidence of value most likely to make the best case to the highest execs — tagged in at No. 9.

The need to demonstrate value also ranked No. 6 on the European chart. In sharp contrast to the U.S. response, however, the Europeans ranked the need for metrics at No. 3.

Does this mean that North American firms are failing to take the measurement issue seriously? Possibly, CSC Index concluded. But not necessarily, Haslund noted. Coming up with meaningful metrics in the IS context, he said, is no mean feat; skepticism voiced by IS leaders could well imply that they are taking the issue too seriously to rattle off glib replies.

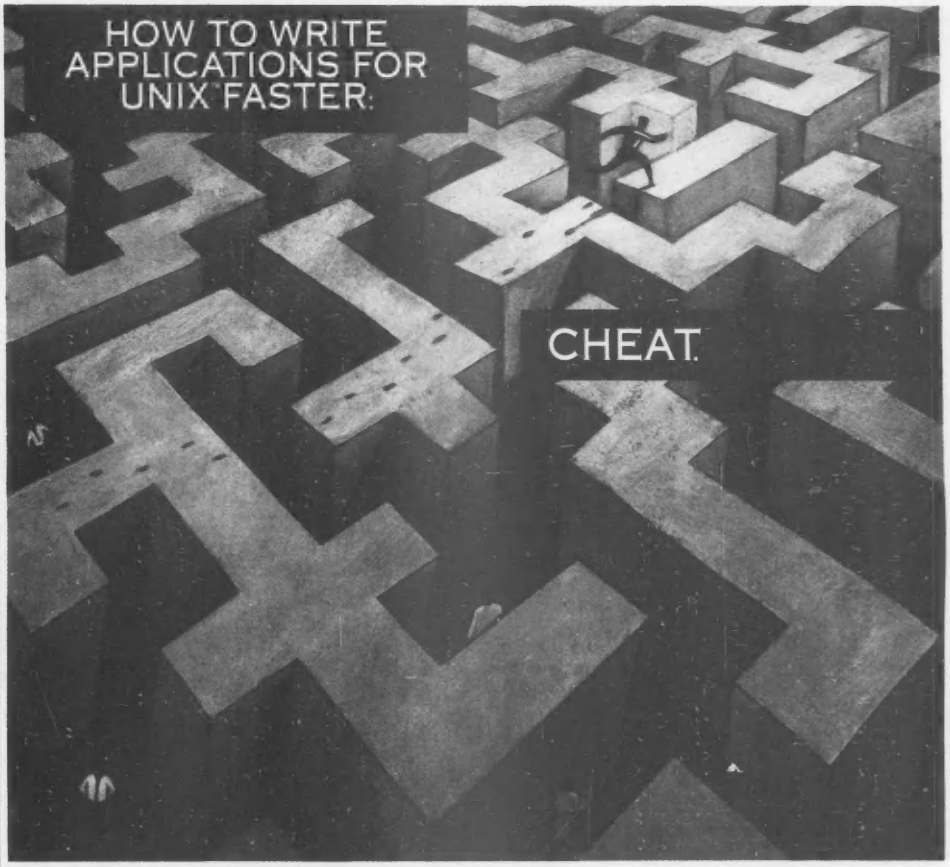
Critical list

Systems development shops target the following as 1992's key issues:

1. Rapidly responding to system requests.
2. Increasing developer productivity.
3. Identifying and developing strategic IS.
4. Developing an information architecture.
5. Dealing with maintenance, systems obsolescence and migration to new systems.
6. Demonstrating the value of development projects to senior executives.
7. Instituting a formal total quality management program in systems development.
8. Achieving support for cross-functional systems.
9. Developing and implementing metrics for systems development.
10. Managing end-user systems development.

TOP 10 LIST

Source: CSC/Index, Inc. CW Chart: Stephanie Faucher



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IS, business worlds meld, not collide

BY NELL MARGOLIS
CW STAFF

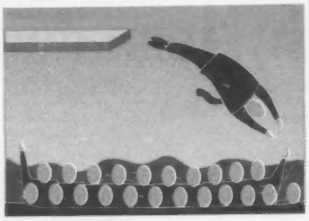
CHICAGO — If you are among the many who believe that commercial trends, as well as products, bubble up and out from university laboratories — Achtung, Baby: The barriers between information systems and the businesses it serves could be about to give way.

"At Harvard Business School," said business administration professor James Cash Jr., "We no longer teach organizational structure, management control and information systems as three separate disciplines." Rather, he said, Harvard teaches the disciplines as companies had better quickly learn to conceive of them — as three interrelated aspects of successful business practice.

Executives from several of the companies that are practicing what Harvard preaches agreed that time has run out on the separatist mode. However, they also cautioned that if the transition to partnership seems painless, you are probably doing something wrong. The pioneering IS and business leaders also agreed that communication — early, often and in every conceivable direction — is the best bet for staving off the greatest number of potential problems and salving those that cannot be avoided.

In a keynote address at LOMA's annual conference last week, Cash sounded a theme echoed by speaker after speaker at the three-day meeting of the insurance industry management association: The conference topic — the urgency of forming IS/business partnerships — is not just academic and is by no means an exclusive insurance industry concern.

However, many noted, the information-intensive nature of the insurance product may be accelerating the urgency for insurance companies.



"There should be more than mere partnership," said Donald Peterson, chief executive officer of Lake Forest, Ill.-based Benefit Trust Life Insurance Co. "An *integration* of the [business and IS] roles is necessary in an industry as IS-reliant as insurance."

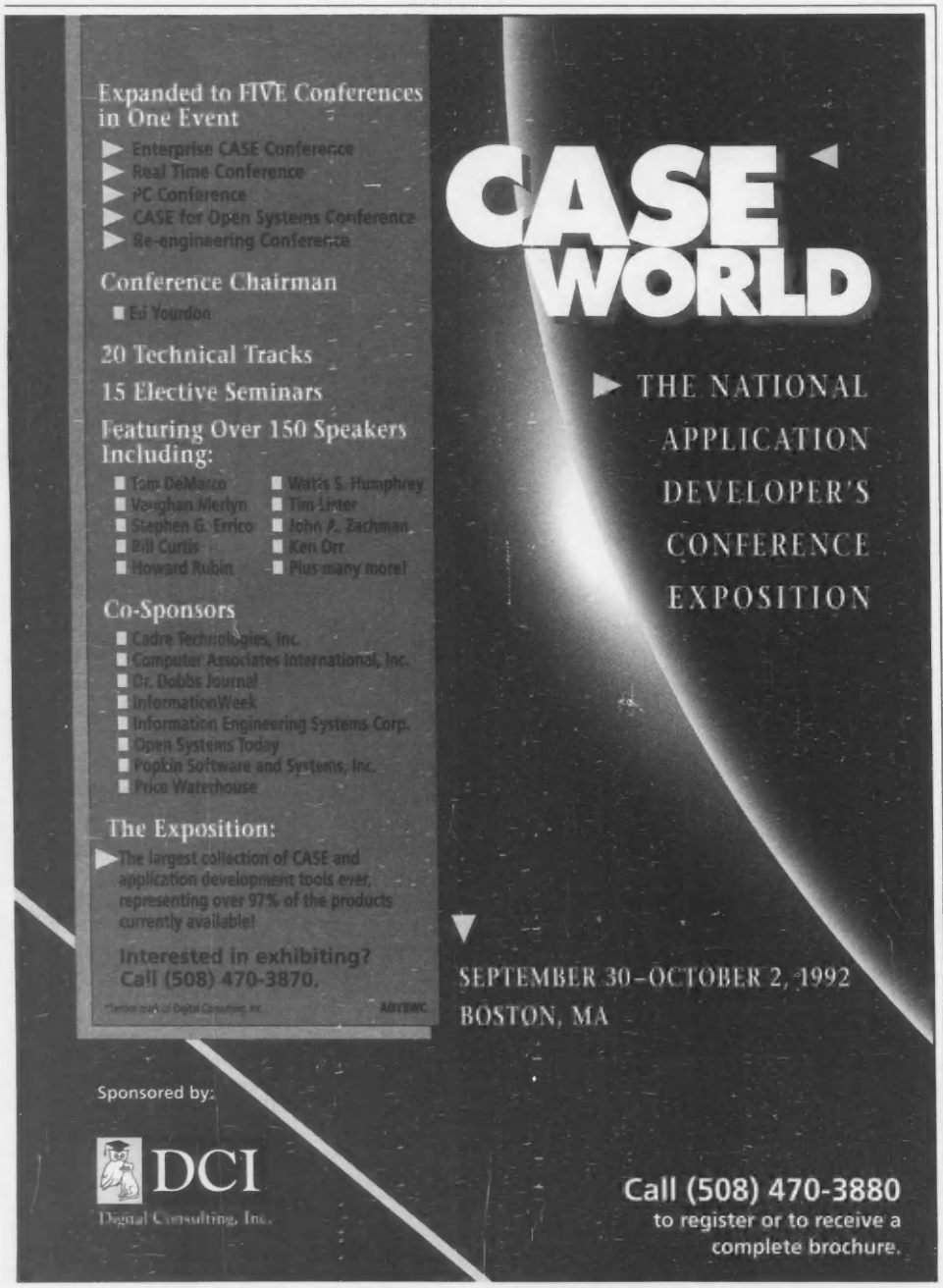
Tunnel vision and turf protection have delivered a "past decade of failed partnership in the insurance industry," said Peterson, decrying IS and business leaders "each centered on his own discipline, looking for the latest hot button. We can't go on this way."

To go on any other way, however, is "a gut-wrenching change — and you have to be prepared for that," said Eric Scheffler, senior vice president at Philadelphia-based Cigna Corp. The $66 billion insurance firm is in the midst of a transition from classic linear organization to cross-functional, results-targeted, business/IS integrated teams led by coaches rather than overseen by bosses.

By the book

Among the critical lessons learned so far, Scheffler said, are the following:

- Face the fact that teamwork eliminates a lot of redundant work — which, in turn, means you will need a lot fewer people. Some can be redeployed throughout the company; others probably cannot. Bite the job elimination bullet early, Scheffler advised: "You pay a very high price if you don't."
- Assume you are going to have to throw out your old reward system and come up with a new one, tailored to teamwork rather than individual achievement. Cigna, Scheffler said, was caught short in this department and is now hard at work brainstorming new ways to compensate new kinds of work groups. One idea sparking interest, he said, is a two-part pay package including a guaranteed floor based entirely on job slot, with the remainder a kind of profit-sharing keyed to team results.
- Remember that learning to walk in the other fellow's shoes is a relative thing. "Don't expect your techiest techie to turn into a customer service person," Scheffler said. "That's not going to happen." However, "He does have to be able to pick up a phone and answer a customer call when no one else is there. That's what the team concept is all about."
- Don't eliminate "onerous control" until there are other methods in place to get the daily work done.
- Estimate how much training you are going to do; then assume you have underestimated and plan accordingly.
- Adopt metrics. Tangible measures of improved efficiency, effectiveness and morale, said Scheffler and other executives who addressed the LOMA conferees, are indispensable not only for selling the measured concept to senior management but also for reassuring the pioneers that they have not foresaken the comforts of outdated but familiar ways in vain.



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CALENDAR

JULY 12-18

American Association for Artificial Intelligence (AAAI) National Conference. San Jose, Calif., July 12-16 — Contact: Carol Hamilton, AAAI, Menlo Park, Calif. (415) 328-3123.

Software User Documentation: Designing for Usability. Boston, July 13-14 — Contact: Digital Equipment Corp., Marlboro, Mass. (508) 297-6910.

Client/Server Boot Camp. San Francisco, July 15-17 — Contact: Database Server Systems, San Francisco, Calif. (415) 583-3000.

JULY 19-25

ComNet. San Francisco, July 20-23 — Contact: Matt Mandino, World Expo Corp., Framingham, Mass. (800) 225-4698.

Object World '92. San Francisco, July 20-23 — Contact: Lynn Fullerton, World Expo Corp., Framingham, Mass. (800) 225-4698.

Memory Expo '92. Santa Clara, Calif., July 21-23 — Contact: Memory Expo '92, Englewood, Colo. (303) 220-0600.

QuarkXPress Users Conference. New York, July 22-23 — Contact: QUI, Salem, N.H. (603) 898-2822.

JULY 26-AUG. 1

The Managing Enterprise Networks Conference. Boston, July 27-29 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Gigabit Networks. Washington, D.C., July 28-29 — Contact: Wilma Hurwitz, Technology Transfer Institute, Santa Monica, Calif. (310) 394-8305.

PC/Canada. Toronto, July 28-30 — Contact: The Interface Group, Needham, Mass. (617) 449-8938.

Color Connections 4. Boston., July 30-Aug.1 — Contact: Graphic Communications Association, Alexandria, Va. (703) 519-8162.

AUG. 2-8

GroupWare '92 Conference & Exposition. San Jose, Calif., Aug. 3-5 — Contact: Niehaus Ryan & Haller, San Francisco, Calif. (415) 615-7910.

Fed Micro '92. Washington, D.C., Aug. 5-6 — Contact: Sylvia Griffiths, National Trade Productions, Inc., Alexandria, Va. (703) 683-8500.

Fose CD-ROM and Multimedia Conference & Exposition. Washington, D.C., Aug. 5-6 — Contact: Sylvia Griffiths, National Trade Productions, Inc., Alexandria, Va. (703) 683-8500.

AUG. 16-22

SIGCOMM '92. Baltimore, Aug. 17-20 — Contact: SRI International, Menlo Park, Calif. (415) 326-6200.

Windows & OS/2 Conference. Boston, Aug. 19-21 — Contact: CM Ventures, Inc., Emeryville, Calif. 94608 (510) 601-5000.

AUG. 23-29

Interex Users Conference. New Orleans, Aug. 23-27 — Contact: Michelle Pettigrew, Interex, Sunnyvale, Calif. (408) 738-4848.

SynOptics User Group Conference. Washington, D.C., Aug. 24-26 — Contact: Dennis Farr, SynOptics User Group, Santa Clara, Calif. (408) 988-2400.

Marketing the IS Organization Internally. Columbus, Ohio., Aug. 25 — Contact: The Ouellette & Associates Registrar, Bedford, N.H. (603) 623-7373.

Auto-Tech. Detroit, Aug. 25-27 — Contact: Automotive Industry Action Group, Southfield, Mich. (313) 358-3570.

Downsizing Expo. San Francisco, Aug. 25-27 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

Computerfest '92. Dayton, Ohio, Aug. 29-30 — Contact: Mark Hanslip, DMA Computerfest, Dayton, Ohio (513) 263-3378.

AUG. 30-SEPT. 5

International Training Conference & Exposition. Anaheim, Calif., Aug. 31-Sept. 2 — Contact: Russell F. McKinnon, Trade Associates, Inc., Rockville, Md. (301) 468-3210.

SEPT. 20-26

Image World. New York, Sept. 21-25 — Contact: Benita Roumanis, Knowledge Industry Publications, Inc., White Plains, N.Y. (914) 328-9157.

Virtual Reality '92. Westport, Conn., Sept. 23-25 — Contact: Meckler Conference Management, Westport, Conn. (203) 226-6967.

SEPT. 27-OCT. 3

CASE World Conference & Exhibition. Boston, Sept. 30-Oct. 2 — Contact: Digital Consulting, Inc., Andover, Mass. (508) 470-3880.

CD-ROM Expo '92. Boston, Sept. 30-Oct. 2 — Contact: Mitch Hall Associates, Dedham, Mass. (617) 361-2001.

OCT. 4-10

The New Tools for Design and Design Production Conference. New York, Oct. 4-6 — Contact: The Center for Computer Graphics for Design, Santa Fe, N.M. (505) 986-0523.

Scan-Tech '92. Anaheim, Calif., Oct. 5-8 — Contact: AIM USA, Pittsburgh, Pa. (412) 963-8588.

OCT. 11-17

Networld '92. Dallas, Oct. 13-15 — Contact: Kathy Ryan, Networld, Fort Lee, N.J. (201) 346-1400.

OCT. 18-24

Riscon '92 Conference and Exhibition. New Orleans, Oct. 18-21 — Contact: National Retail Federation Division, New York, N.Y. (212) 244-8780.

APICS Conference and Exhibition. Montreal, Oct. 18-23 — Contact: The Educational Society for Resource Management, Falls Church, Va. (703) 237-8344.

OCT. 25-31

The 13th Annual Treasury Management Conference. San Diego, Oct. 25-28 — Contact: Treasury Management Association, Baltimore, Md. (301) 907-2862.

ASIS Annual Meeting. Pittsburgh, Oct. 26-29 — Contact: Richard B. Hill, ASIS, Silver Spring, Md. (301) 495-0900.

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Try putting yourself in vendor's shoes

BY CANDEE WILDE
SPECIAL TO CW

Information systems professionals in user companies sometimes get frustrated because vendor companies don't seem to understand their needs — unless, of course, they've worked in the vendor's domain before.

IS executives at user companies who have worked at a vendor company say the vendor experience has helped them hone their skills to perform their current functions more effectively.

For example, they are familiar with what a vendor can and can't do for them. In addition, understanding how a product is conceived, developed, priced and manufactured can help users make better buying decisions. These skills can make IS professionals more attractive to potential employers.

Firm foundation

"I have had a number of clients who, when they are identifying specifications for a senior information systems job, will say they want someone who started their career with a large vendor," says W. Richard Howard, managing vice president of the information technology practice at recruiting firm Korn/Ferry International in Los Angeles. The primary reason for this is the extensive training programs these companies provide, he says.

Certain positions with vendor companies, particularly those that involve sales and marketing exposure to users, emerged as the most logical stepping-stones into the user world.

"Regardless of what role you play at a vendor, you are to some degree part of a marketing approach," says Leilani Allen, senior vice president of information technology at Sears Mortgage Corp. in Riverwoods, Ill.

"Learning how to market technology is tremendously valuable in the corporate user world, and most senior IS executives don't acquire that knowledge. They become frustrated with their inability to sell technology to their clients within their own company," she says.

Working at Amdahl Corp. also gave Allen the opportunity to interact with IS personnel at all levels in many different companies.

"You get a perspective on how information systems shops are organized and how they approach decisions — [knowledge] I don't think you could match working at a single user company," she says.

Allen says she thinks the position of systems engineer at a vendor provides an excellent background for future user-side IS managers, as would time spent as a technology or management consultant.

However, for some IS managers, it's the managerial, not technical, skills learned while at a vendor company that have been valuable.

"The positions I have had didn't require me to deploy detailed technical knowledge" gained at IBM, says David Hultsman, who was a systems engineer trainee at IBM at the beginning of his career and is now director of IS at Texas Eastern Products Pipeline Co. in Houston.

Hultsman says, however, that he has been able to apply to his current position what he learned at IBM about time management, project planning, organization and dealing with office politics.

In need of know-how

Allen agrees with the importance of management know-how. "Working for the vendor to deal with information systems managers, teaching them how to use the product, is a good spot."

The vendor universe can provide a highly effective tutorial for life in the user world, says Randy Dieterle, vice president and chief information officer at PRC, Inc., a McLean, Va., systems integrator and a subsidiary of Black & Decker Corp. in Towson, Md.

Dieterle says the vendor company job that would best help someone prepare for a move to a user company is the postsales technical support representative — the person who talks to users about their problems and concerns.

"This person is absolutely in the best of all seats," Dieterle explains. "He is a customer advocate internally and the company's advocate to the customer."

In addition, solving user problems requires ongoing contact with the vendor's internal development staff as well as the sales and marketing organizations. Such contact broadens a person's skills base.

Carla D. Thomey knows about customer contact. As a former systems representative at Hewlett-Packard Co., learning to solve the problems that arose with HP customers has helped her "service my users, who are my customers," Thomey says.

Her experience at HP has been most valuable in her current post as director of business and finance with responsibilities including data processing at Dallas-based Meeting Planners International.

However, IS managers say, the decision to pursue a career with a user or vendor company requires some introspection.

If a person loves technology and wants to shape the development and growth of information technology, he may be happiest in the vendor community. The user company mind-set tends to be helping the business, with technology as one way to do it.

"It's like the scientist vs. the engineer: The scientist is there to make the discoveries; the engineer is there to apply them," Allen says.

Wilde is a free-lance writer based in Easton, Conn.

From both sides now

Does user experience help someone wanting to work at a vendor company the same way vendor experience helps those at user sites? Randy Dieterle thinks so. He went from a user company to a vendor company early in his career.

"If you're manufacturing tractors for farmers, having been a farmer helps you understand the customer," says Dieterle, vice president and CIO at PRC, a McLean, Va., systems integrator. "Oracle hired me because I was a user and could relate to user needs from the vendor side." At Oracle Corp. in Belmont, Calif., Dieterle was vice president of U.S. systems and support.

Dieterle compares the experiences of working on both sides of the fence: "It is a lot more complicated to build the house than it is to sell the nails, wood and paint needed to build the house. The vendor's universe of problems is a lot narrower."

CANDEE WILDE

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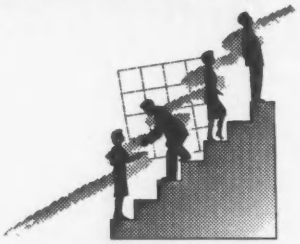

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Experience wins over courses

Fast Track is a twice-monthly column dedicated to answering questions on career directions. This week's guest adviser is Brian Hoffman, a partner at Winter, Wyman & Co., a placement firm in Waltham, Mass. Hoffman has specialized in IS placement for 12 years.

Q Will taking a course in Novell, Inc. technology or the C language help me in my job search?

A Upgrading your skills is always a good idea, but be prepared for the fact that most employers do not regard courses as a substitute for experience. Training in Novell, C or any other technology may round out your background, but it is no guarantee you'll be viewed as qualified for positions requiring familiarity with with these specialties.

Q I want to get more analysis experience, but my company keeps me tied up with coding assignments. Then they hire new analysts from the outside. How can I get experience? Will a course in systems analysis help?

A Yes, a course in structured systems analysis and design will be very helpful. It will give you the foundation skills to do more. It's also a strong signal to your boss that you are very serious about your career growth.

But don't stop there. Look for opportunities to volunteer yourself for any analytical tasks that come up. Go for every chance you can to show what you can do.

It is unfortunate that some companies overlook their internal resources, preferring to hire someone new rather than retrain an employee. This may be more expedient, especially when an important project comes up suddenly, but it is ultimately shortsighted. The time and effort that will be spent teaching new employees what they need to do might well be spent developing a current staff member.

Providing such development opportunities increases employee satisfaction and decreases expensive turnover.

FAST TRACK
CAREER ADVICE FOR THE '90s

Q Is the IBM mainframe job market disappearing? I see fewer of those jobs these days.

A The IBM mainframe market is not disappearing. It is, however, far less dominant today than it was 10 years ago. Mainframes are being used more selectively and efficiently as corporate information assets are re-engineered to take advantage of today's technologies.

Mainframes are also serving and will continue to serve as host processors for extended systems that use connectivity tools and distributed solutions as repositories for large, complex, core databases and as transaction processing "engines" for what would be called traditional data processing applications.

A strong, although not growing, demand for solid design and operational expertise in mainframes will continue throughout the 1990s.

Work to keep your skill base up to date and seek to augment it with exposure to connectivity products and distributed systems issues.

Q I keep hearing Cobol is a dead end. Is this true?

A We began to hear that Cobol was dead or dying more than a decade ago. Yet today, more than 45% of our clients seek Cobol as a primary or secondary computer language.

It is important to remember that a huge portion of corporate business information systems are built on Cobol. The costs of converting that information infrastructure would be astronomical, so you can definitely count on Cobol being around for a good while longer.

Several newer systems architectures use more than just Cobol, however, so it's worth the time and effort to diversify your skill set now to prepare for broader opportunities downstream.

☞ *We want to hear from you. Call your career questions in using the Fast Track line at (508) 820-8522; send them via MCI Mail to KDWYER or send them by fax to Kelly E. Dwyer at (508) 875-8931. Letters may be edited. If we use your question, we'll send you a gift.*

TIP of the MONTH

Job getting stale? Here's how you can revive interest in your work

Take a look at how you could fundamentally change the way you're doing business and where there are opportunities to use IS. If you do that, I don't know how you can't get excited about the opportunities that are out there.

Parry Lagro, vice president
Corporate information services
Alliant Health System, Louisville, Ky.

The low-activity periods are the ones where people have to reach inside themselves and see how they can better their position, get themselves trained and move ahead. It's not the time to make a significant change in your career direction because people should always move toward something and not away from something.

Joseph Nash, vice president
Management information services
Cadbury Beverages, Inc., Stamford, Conn.

I go into some area of my company where there's very little data processing and try to look for some creative ways to see if I can find a new marketplace.

George Brenner
Director, corporate information services
MCA, Inc., Universal City, Calif.

Relook at systems and see what creative things you can do. You should also go out and actually participate in the user base. All of a sudden, you could find out that the user has "a terrible job." You'll look at it and say, "If we approach this thing slightly differently — if I modify this — I could make their job so much easier." Then suddenly what you've done is added some spark to someone else's life, which eventually comes back to you.

Robert Houck, IS manager
Suma Fruit International (USA), Inc., Sanger, Calif.

Compiled by Kelly E. Dwyer, assistant editor, features.

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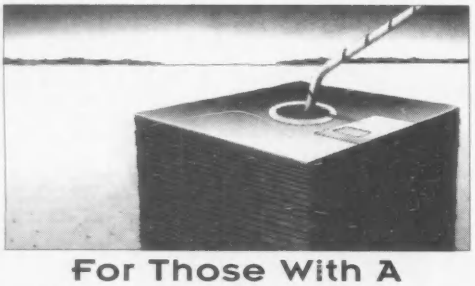

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- 2+ years programming experience in Pascal or "C" in a VAX environment
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- 3+ years systems analyst experience in level "C" language in a UNIX environment required
- Experience with Data Communications protocols a plus
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- 3-6 years heavy storage management experience in large MVS/ESA, JES3 Center
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- ICF catalogue experience
- Knowledge of storage software tools and DASD hardware industry trends
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Position located in Dallas/Fort Worth

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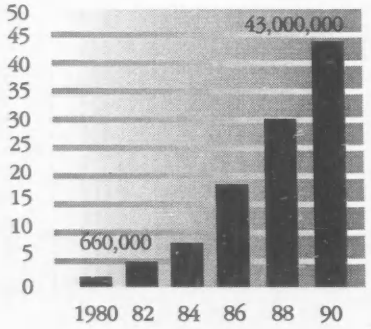
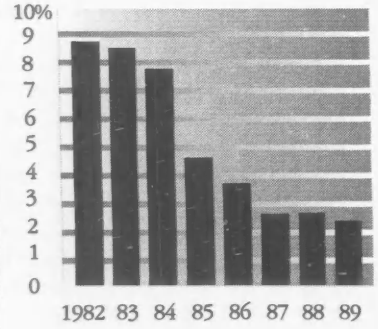


Fewer campus freshman are choosing computer careers**



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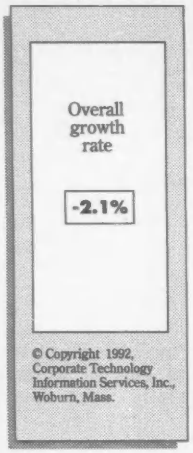

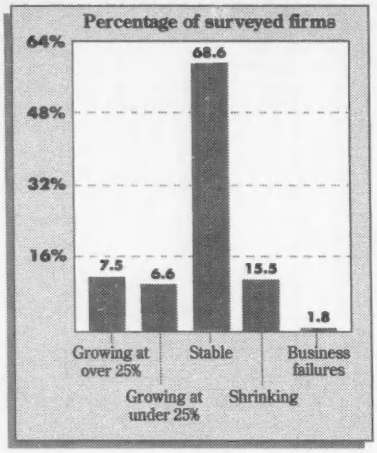

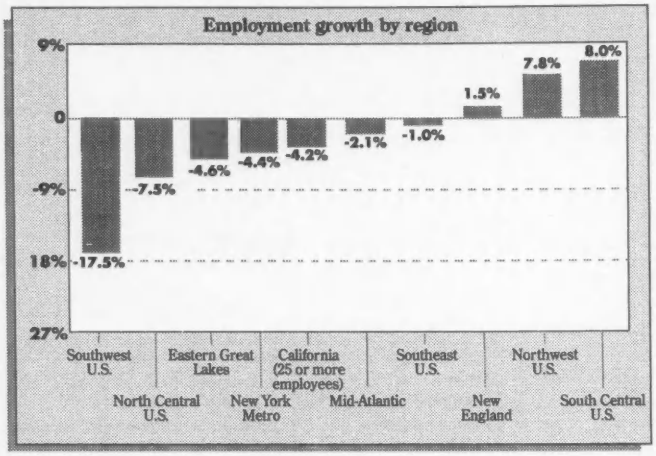

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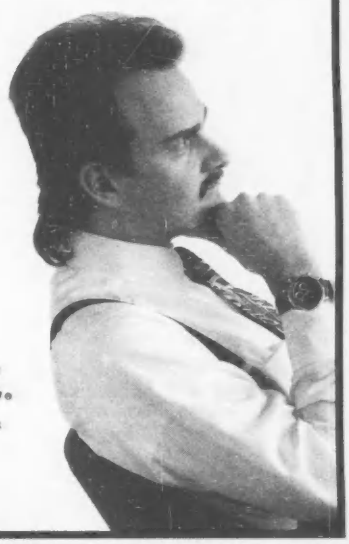

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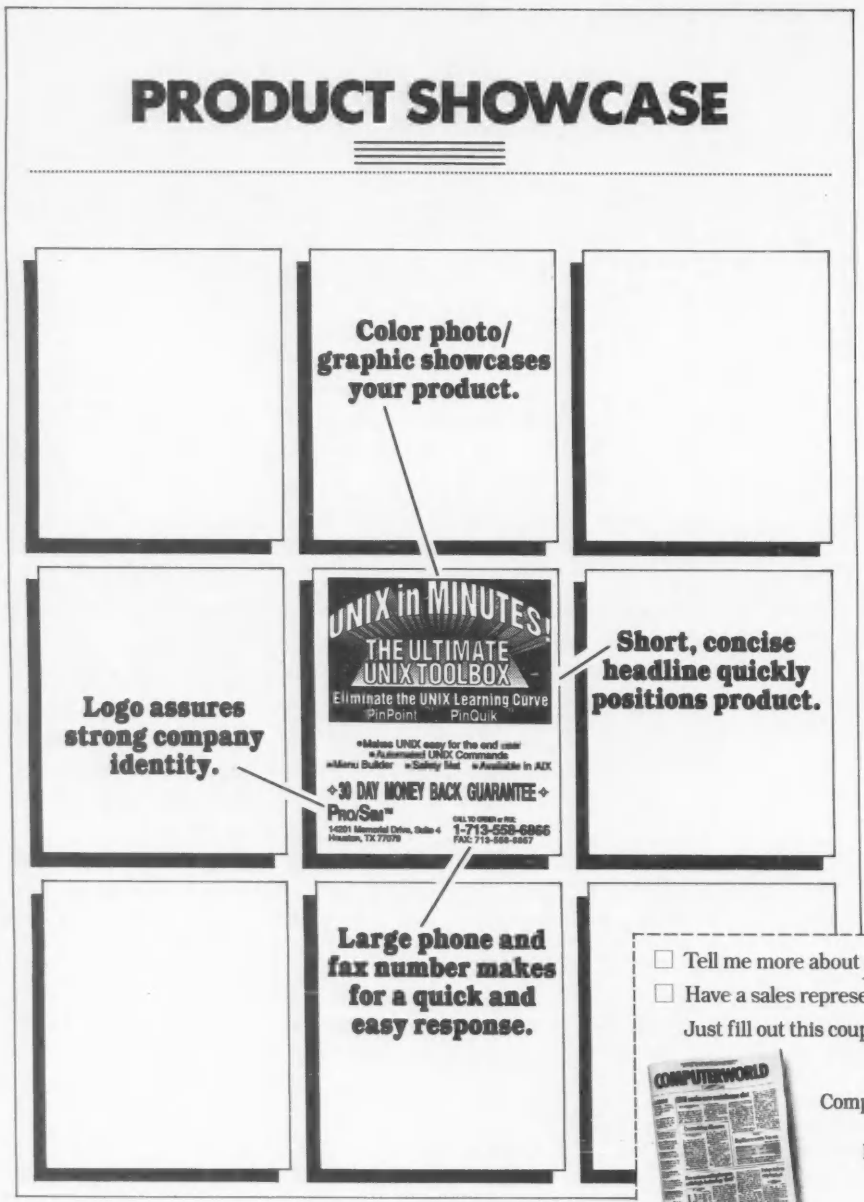

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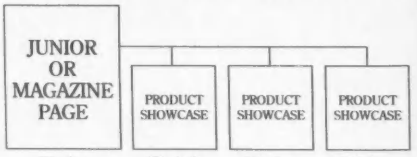

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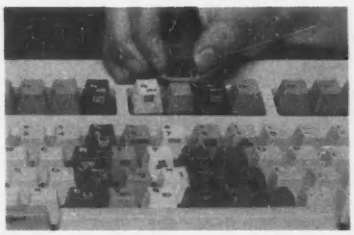

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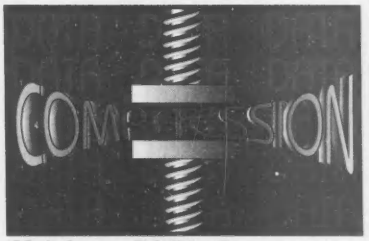

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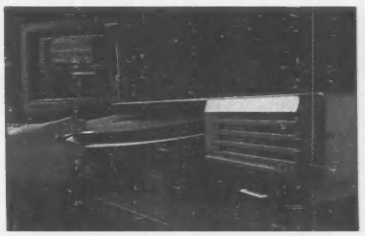

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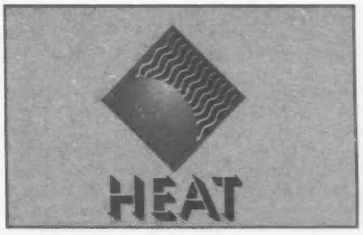

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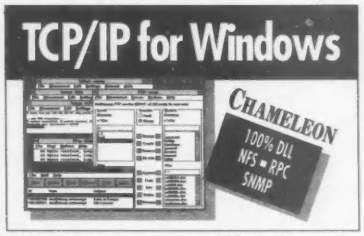

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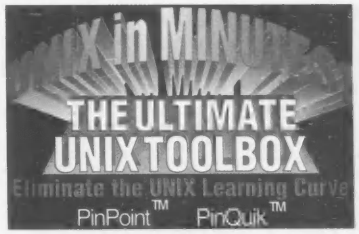

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BY ALICE LAPLANTE
SPECIAL TO CW

At Cedar Point, an amusement park in Sandusky, Ohio, the standard terminal sitting on users' desks is an IBM 3180 — a model that IBM stopped manufacturing more than five years ago.

"IBM had gotten up to charging $22,000 a year [maintenance] for a $1,600 terminal," says Don Race, director of information systems, "so it became much cheaper to locate the spares ourselves and either swap them in or use them for parts as we needed them." Now, he estimates that each repair costs $300 to $400.

This tale illustrates two classic concerns about servicing obsolete computers: finding spare parts and trained repair people.

The reason companies continue to service older equipment: They have invested a lot of money and time in it, or are planning an upgrade and need to maintain the present system until then.

Limited help

Without parts, machines can't be fixed. But without workers who understand the idiosyncrasies of a system, all the parts in the world won't do any good.

Partly because of these difficulties, most computer vendors limit how long they will write service contracts for older machines. Policies generally expire five to 10 years after the manufacturing of the machine has ceased. After that, most suppliers will write contracts only if they are certain of being able to locate the parts and the expertise.

When companies such as Hewlett-Packard Co. can "no longer assure customers that parts will be available, we will sign contracts on a 'best-effort' basis," says Brenda Vathauer, product marketing manager for hardware support at HP's Systems Support Division in Mountain View, Calif. Translation: There are no guarantees.

Fast-rising service costs on older systems are no accident, according to analysts.

"To encourage customers to upgrade to the latest model, it's not uncommon for vendors to jack up the price of maintenance on older machines," says Helen Dragoon, an analyst at International Data Corp. in Framingham, Mass. In turn, user firms are relying on third-party maintenance providers to service equipment.

Race, who buys 3180 terminals for replacements and parts from third-party maintenance providers and used equipment vendors, says anyone who is moderately resourceful should not find it difficult to get parts. Good bets are user groups, classified ads in computer trade journals and the original manufacturer. "Even if the vendor doesn't sell that particular machine anymore, it probably can give you the name of other customer sites," Race says.

Another choice for keeping older systems running is the so-called fourth-party market. These organizations specialize in used equipment or parts from specific machines or vendors.

Scavenger hunt

While third-party vendors acquire their parts directly from the vendor, fourth parties buy used equipment on the open market and then refurbish or scavenge it for parts. "You could call it a high-technology junk business," says John Swenson, president of fourth-party vendor Quinstar Corp. in St. Paul, Minn.

The main advantage of fourth-party maintenance is prices 25% to 30% below manufacturer costs, analysts say. But be warned: Quality and reliability may be a problem. Most fourth-party firms are small, new and could lack solid track records.

But there's good news, too. During the last two years, many vendors have changed their servicing policies on older equipment in hopes of boosting profits.

IBM, for instance, abolished its end-of-service plan, making every attempt to fix outdated machines, says Mike Minuto, acting director of service planning for industry systems.

LaPlante is a free-lance writer based in Palo Alto, Calif.

Old faithfuls . . .

Unsure about where to get good service for older equipment? One source worth trying is *The Independent Service Directory*. Published biannually by United Publications, Inc. in Yarmouth, Maine, the directory provides a guide to more than 800 independent service providers, listed by vendor and geographic location.

In addition, PC Parts Express, Inc., based in Carrollton, Texas, carries original parts for a number of key personal computer and printer manufacturers, including Hewlett-Packard. The firm will ship orders by the next business day.

$1,000 swap

Harvey Nelson, IS manager of Yamhill County, Ore., found that keeping his circa 1960s Unisys Corp. mainframe covered by an on-site maintenance contract was an idea whose time had come and gone.

Keeping the 22-year-old system running took some ingenuity. Until January 1990, Yamhill County had contracted with Unisys to service the antiquated system. But by that time, the maintenance contract cost a whopping $2,577 a month. However, Nelson needed to keep the system going until his staff completed the conversion to a new Unisys A6 mainframe.

With the help of a Unisys sales representative, Nelson found a site that had just unplugged its own Unisys B. "We bought the entire mainframe from them for $100," he says, "and swap in parts from it to keep our own system going."

Nelson completed the conversion three months ago. Now, he says, the monthly maintenance bill is about $1,500.

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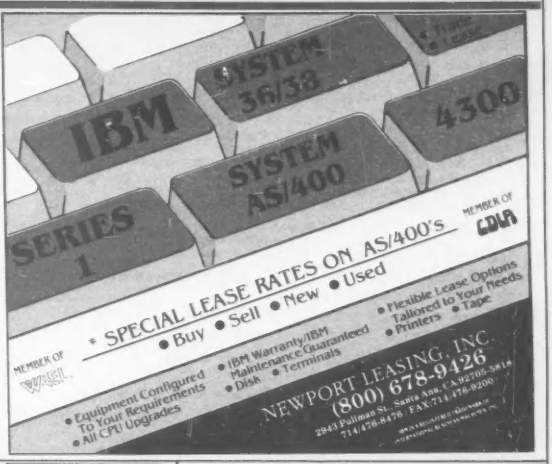
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The BoCoEx index on used computers

Closing prices report for the week ending June 19, 1992

	Closing price	Ask	Bid
IBM AT 339	$500	$700	$250
PS/2 Model 30 286	$500	$900	$300
PS/2 Model 35SX	$1,325	$1,500	$800
PS/2 Model 55SX	$1,000	$1,300	$800
PS/2 Model 60	$600	$900	$325
PS/2 Model P70	$2,300	$3,000	$1,500
PS/2 Model 80	$1,600	$1,800	$1,100
PS/2 Model 95	$3,900	$4,200	$3,300
Compaq Portable II	$425	$500	$375
Portable III	$550	$650	$250
Portable 386	$1,300	$1,800	$1,000
SLT-286	$700	$900	$400
LTE-286	$850	$1,000	$500
Deskpro 286E	$500	$1,000	$325
Deskpro 386/33	$2,000	$2,450	$2,200
Apple Macintosh Classic	$800	$900	$700
SE	$750	$875	$600
IIX	$2,700	$3,250	$2,000
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CDCSA is releasing a Request for Proposals (RFP), PIN 85892C805089, on June 22, 1992. This RFP is for the integration of SNA and Non-SNA traffic into a single, Multiprotocol Internetwork. The RFP requires hardware, software, services, and maintenance for five years.

Vendors capable of responding to this solicitation should arrange to pick up the RFP from CDCSA, 253 Broadway, 9th Floor, New York, N.Y. 10007, Attention: Contracts Unit (212) 240-4915, from Monday through Friday, 9:00 A.M.-5:00 P.M. A Proposers' Conference is scheduled for 11:00 A.M., Wednesday, July 15, 1992, at 253 Broadway, 9th Floor, BFA Conference Room, New York, N.Y. 10007. Proposals are due by August 18, 1992.

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Sealed proposals will be received by CDPA, 301 N. Lamar St., 301 Bldg, Suite 508, Jackson, MS 39201 for the following:

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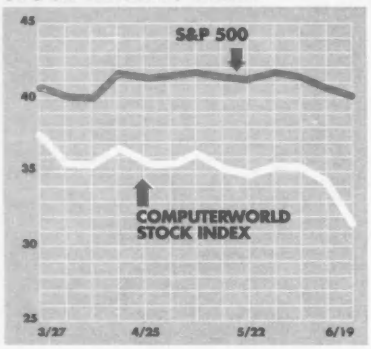

Industry Almanac

ANALYSIS IN BRIEF

U.S. Computer Industry
Rick Martin, analyst
The Chicago Corp.
June 5

The industry seems to be emerging from the recession, but shrinking backlogs are a concern.

U.S. hardware and software orders grew by 10% from March to April, the latest month for which data is available. Shipments increased about 12% during that time. These trends will lead to a period of better margins and a series of positive earning surprises as 1992 wears on, but the backlog picture is a ticking time bomb.

It will take a significant upturn in orders to reverse the recent downward motion of vendor backlogs. Any slowdown in orders could ripple through to shipments in just one or two months.

Software and Services
Louis Giglio, analyst
Bear, Stearns & Co.
June 5

Stock in **Sterling Software, Inc.** (SSW) trailed off virtually daily after a 2 million share offering was announced last month. Though the deal was withdrawn earlier this month, the stock remains depressed. Given that the fundamentals of the company are strong — particularly in the electronic data interchange sector — Sterling stock is attractive in the mid- to upper teens.

Autodesk, Inc. (ACAD) continued to gain ground after the company reported a better than expected quarter. The latest version of AutoCAD, a computer-aided design and engineering package, is expected to ship next month, which will kick revenue upward.

RECOMMENDATION CHANGES

UPGRADED FROM NEUTRAL TO BUY: **Informix Corp.** (Alex. Brown & Sons, Inc.). After suffering operating losses in 1990 and 1991, Informix (IFMX) has begun a turnaround, posting profitable operations for the past four consecutive quarters. Most recent quarterly financials were boosted substantially by an initial payment from The Boeing Co., related to a large government contract. The contract covers the use of Informix relational database products in a decision support system being built for the Army National Guard and Army Reserve.

KIM S. NASH

Computerworld Friday Stock Ticker

CLOSING PRICES FRIDAY, JUNE 19, 1992

TOP PERCENT GAINERS

Wordstar (L)	15.79
Artel Communication Corp.	10.00
Digital Systems Int'l Inc.	7.69
Spinnaker Software	7.69
Chipcom Corp.	7.50
Intel Corp.*	6.57
Data Switch Corp. (L)	5.22
Exabyte	5.19

TOP PERCENT LOSERS

Advanced Micro Devices	-36.13
Dell Computer Corp.	-33.85
Microcom Inc.	-25.64
Rasterops (L)	-25.00
Conner Peripherals*	-21.28
Phoenix Technologies (L)	-21.15
AST Research Inc.*	-20.30
State of the Art	-20.00

TOP DOLLAR GAINERS

Intel Corp.*	3.25
IBM*	2.00
Cabletron Systems	1.88
Chipcom Corp.	1.50
American Info Techs Corp.*	1.50
Exabyte	1.38
Autodesk Inc.	1.25
BGS Systems Inc.	1.25

TOP DOLLAR LOSERS

Apple Computer Inc.*	-9.88
Dell Computer Corp.	-8.13
Advanced Micro Devices	-5.38
Conner Peripherals*	-5.00
Hewlett-Packard Co.*	-4.88
Matsushita Electronics	-4.50
Easel Corp.	-4.50
Motorola Inc.*	-4.25

Exch	52-Week High	52-Week Low		June 19 Close	Wk Net Change	Wk Pct Change
Communications and Network Services						**Off 3.48%**
OTC	15.00	6.75	3 COM Corp.*	12.63	-0.38	-2.88
NYS	65.75	55.75	American Info Techs Corp.*	64.25	1.50	2.39
NYS	44.63	32.88	AT&T*	42.25	-1.13	-2.59
OTC	4.25	1.13	Artel Communication Corp.	1.38	0.13	10.00
NYS	50.63	40.25	Bell Atlantic Corp.	44.75	0.63	1.42
NYS	52.63	43.38	Bellsouth Corp.	48.75	0.38	0.78
NYS	7.75	4.75	Bolt, Beranek & Newman	4.88	-0.25	-4.88
NYS	65.88	36.63	Cabletron Systems	48.00	1.88	4.07
OTC	31.00	11.75	Chipcom Corp.	21.50	1.50	7.50
OTC	48.50	14.63	Cisco Systems Inc.	44.00	-3.00	-6.38
OTC	35.25	13.50	Compression Labs Inc.	13.50	-1.75	-11.48
OTC	3.38	0.88	Data Switch Corp. (L)	1.25	0.06	5.22
NYS	23.63	12.38	Digital Comm. Assoc.*	19.38	-0.88	-4.32
OTC	17.75	8.50	Digital Systems Int'l Inc.	10.50	0.75	7.69
OTC	8.13	3.63	DSC Communications	4.50	-0.13	-2.70
OTC	10.88	4.88	Fibronix Int'l Inc.	4.88	-0.75	-13.33
OTC	37.50	13.75	Fibronics Corp.	18.25	-1.25	-6.41
OTC	3.38	1.13	Gandalf Technologies Inc.	2.50	-0.25	-9.09
OTC	2.50	1.19	Gateway Communications	1.75	-0.13	-6.67
NYS	5.50	2.13	General Datacomm Inds.	3.38	-0.13	-3.57
ASE	5.88	0.50	Go Video	3.00	-0.13	-4.00
NYS	35.00	28.13	GTE Corp.*	31.38	0.38	1.21
NYS	70.63	50.00	ITT Corp.	63.50	-0.50	-0.78
OTC	36.13	25.25	MCI Commmunications Corp.	33.00	-0.50	-1.49
OTC	14.50	6.25	Microcom Inc.	7.25	-2.50	-25.64
NYS	18.25	8.25	Network Equipment Tech.*	11.13	-1.63	-12.75
OTC	25.50	6.75	Network General	20.00	-1.25	-5.88
OTC	20.00	8.50	Network Systems Corp.	9.75	-0.25	-2.50
OTC	17.88	5.50	Newbridge Networks Corp.	15.75	0.00	0.00
NYS	49.25	34.50	Northern Telecom Ltd.*	34.50	-2.88	-7.69
OTC	65.00	22.63	Novell Inc.*	52.75	-1.50	-2.76
NYS	82.38	68.25	Nynex Corp.*	79.00	0.00	0.00
OTC	37.50	16.50	Octel Communications Corp.	20.75	-2.25	-9.78
OTC	9.88	5.00	Penril Data Comm. Ntwks. (L)	5.00	-0.25	-4.76
OTC	53.00	21.25	Picturetel Corp.	26.63	-2.13	-7.39
OTC	18.75	10.00	Proteon Inc.	12.00	-0.75	-5.88
NYS	24.00	11.63	Scientific Atlanta Inc. (H)	21.88	-0.88	-3.85
NYS	66.00	51.50	Southwestern Bell Corp.	61.63	0.13	0.20
NYS	31.50	20.75	Sprint Corp.	22.25	-0.38	-1.66
OTC	36.25	14.25	Synoptics Communications	28.38	-1.13	-3.81
NYS	38.88	32.88	US West Inc.	35.38	0.00	0.00
OTC	41.25	21.25	Wellfleet Communications	28.25	-3.75	-11.72
PC and Workstations						**Off 10.60%**
OTC	15.25	5.25	Advanced Logic Research (L)	5.25	-0.75	-12.50
OTC	70.00	40.25	Apple Computer Inc.*	44.75	-9.88	-18.08
OTC	32.25	13.25	AST Research Inc.*	13.25	-3.38	-20.30
NYS	19.25	10.13	Commodore Int'l	10.25	-1.13	-9.89
NYS	37.50	22.13	Compaq Computer Corp.*	24.38	-3.38	-12.16
OTC	29.00	13.91	Dell Computer Corp.	15.88	-8.13	-33.85
OTC	7.75	3.00	Everex Systems Inc.	3.88	-0.75	-16.22
NYS	34.00	21.25	Harris Corp.	28.00	-1.13	-3.86
NYS	85.00	44.63	Hewlett-Packard Co.*	66.88	-4.88	-6.79
OTC	16.50	7.38	Mips Computer Systems	9.00	0.13	1.41
NYS	29.75	13.25	Silicon Graphics	17.50	0.13	0.72
OTC	35.88	20.75	Sun Microsystems Inc.*	24.50	-0.25	-1.01
NYS	31.25	23.38	Tandy Corp.*	25.25	-2.00	-7.34
NYS	11.13	5.13	Zenith Electronics	7.25	-0.25	-3.33
OTC	25.50	5.75	Zeos International Ltd. (L)	6.00	-1.13	-15.79
Large Systems						**Off 5.62%**
ASE	20.63	11.63	Amdahl Corp.*	15.25	-0.88	-5.43
NYS	14.00	7.50	Control Data Corp.	13.75	0.00	0.00
NYS	16.38	7.50	Convex Computer (L)	7.50	-0.88	-10.45
OTC	19.63	2.88	Cray Computer	3.25	-0.13	-3.70
NYS	52.25	28.50	Cray Research Inc.*	28.50	-4.00	-12.31
NYS	22.50	7.50	Data General Corp. (L)	7.50	-0.25	-3.23
NYS	71.75	36.00	Digital Equipment Corp.* (L)	36.00	-3.63	-9.15
NYS	106.38	81.63	IBM*	95.00	2.00	2.15
NYS	127.50	93.50	Matsushita Electronics	100.50	-4.50	-4.29
OTC	19.75	9.75	Pyramid Technology	9.88	-1.38	-12.22
OTC	17.88	7.50	Sequent Computer Sys.	14.50	-0.25	-1.69
OTC	18.38	10.00	Sequoia Systems Inc.	10.00	-2.25	-18.37
NYS	54.25	27.25	Stratus Computer Inc.*	42.25	-2.25	-5.06
NYS	15.13	9.50	Tandem Computers Inc.*	12.38	-0.75	-5.71
OTC	3.44	1.13	Tandon Corp.	1.25	-0.13	-9.09
NYS	11.75	3.38	Unisys Corp.*	8.75	0.25	2.94
ASE	7.50	2.00	Wang Labs Inc. (b)*	3.38	0.00	0.00
Software						**Off 4.58%**
OTC	68.50	37.50	Adobe Systems Inc.	44.00	0.50	1.15
OTC	13.25	3.50	Ai Corp.	5.75	-0.50	-8.00
OTC	45.50	17.75	Aldus Corp. (L)	18.00	-1.75	-8.86
OTC	19.75	10.13	American Software Inc.	12.00	0.00	0.00
OTC	20.00	7.50	Ask Computer Systems	11.25	-0.63	-5.26
OTC	57.50	23.25	Autodesk Inc.	35.75	1.25	3.62
OTC	37.75	9.13	Bachman Info. Systems (L)	9.13	-1.38	-13.10
OTC	42.50	28.00	BGS Systems Inc.	36.75	1.25	3.52
OTC	79.00	35.00	BMC Software Inc.	47.00	-1.13	-2.34
OTC	20.50	8.75	Blocks & Babbage	17.25	-0.25	-1.43
OTC	86.75	39.50	Borland Int'l Inc.*	48.00	0.75	1.59
OTC	11.25	4.50	CE Software	5.00	-0.25	-4.76
ASE	14.38	6.50	Cheyenne Software Inc.	12.00	-0.75	-5.88
OTC	20.38	7.25	Cognos Inc.	7.88	-0.63	-7.35
OTC	17.00	7.50	Computer Associates*	12.75	0.50	4.08
OTC	21.50	11.00	Comshare Inc.	11.00	-1.00	-8.33
OTC	47.88	15.00	Easel Corp.	22.25	-4.50	-16.82
OTC	19.50	9.25	Goal Systems Int'l	16.00	-0.75	-4.48
OTC	25.50	11.50	Group I Software	15.50	-0.50	-3.13
OTC	6.63	3.88	Hogan Systems Inc.	3.88	-0.13	-3.13
OTC	36.25	18.38	Information Resources	20.38	-1.88	-8.43
OTC	36.00	5.38	Informix Corp.	29.25	-1.75	-5.65
OTC	3.63	1.06	Intellicorp Inc.	1.63	-0.13	-7.14
OTC	27.75	15.13	Intergraph Corp. (L)	15.13	-0.63	-3.97
OTC	15.00	4.88	Interleaf Inc.	9.25	-0.13	-1.33
OTC	20.25	8.00	Intersolv Inc.	13.00	-1.00	-7.14
OTC	30.00	10.50	Knowledgeware Inc.	11.50	-0.25	-2.13
OTC	45.25	20.25	Legent Corp.*	31.50	-1.00	-3.08
OTC	40.75	18.00	Lotus Development*	25.25	-1.00	-3.81
OTC	7.38	2.38	Meca Software	3.50	0.13	3.70
OTC	22.25	11.38	Mentor Graphics	11.38	-1.88	-14.15
OTC	20.50	6.50	Micrografx Inc.	16.50	0.25	1.54
OTC	88.84	40.34	Microsoft Corp.* (H)	73.50	-1.50	-2.00
OTC	21.13	7.88	Oracle Corp.*	16.13	0.50	3.20
OTC	41.25	11.75	Parametric Technology	35.50	-1.00	-2.74
OTC	11.00	4.75	Phoenix Technologies (L)	5.13	-1.38	-21.15
OTC	25.25	9.38	Platinum Technology	14.50	0.50	3.57
OTC	46.50	27.50	Progress Software Corp.	31.50	-3.25	-9.35
OTC	26.63	11.50	Quartercleck Office Sys.	13.00	0.63	5.05
OTC	29.50	9.00	Rasterops (L)	9.75	-3.25	-25.00
OTC	17.25	7.00	Ross Systems	8.75	0.00	0.00
OTC	26.25	11.25	Software Publishing Corp.	12.50	-1.38	-9.91
OTC	2.50	2.00	Software Toolworks Inc.	3.13	-0.38	-10.71
OTC	7.25	1.75	Spinnaker Software	3.50	0.25	7.69
OTC	16.50	6.25	State of the Art	8.00	-2.00	-20.00
NYS	25.25	10.88	Sterling Software Inc.	14.25	-1.50	-9.52
OTC	30.00	13.00	Struct. Dynamics Research (L)	14.25	-0.50	-3.39
OTC	31.75	15.00	Sybase Inc.	23.00	0.00	0.00
OTC	51.00	20.38	Symantec Corp.	39.13	-1.88	-4.57
NYS	15.50	7.25	Systems Center Inc.*	7.88	-0.88	-10.00
OTC	34.25	8.66	System Software Assoc.	29.00	-2.50	-7.94
OTC	23.75	18.00	Walker Interactive Systems	18.00	-2.25	-11.11
OTC	6.63	2.13	Wordstar (L)	2.75	0.38	15.79
Semiconductors						**Off 6.50%**
NYS	21.50	8.38	Advanced Micro Devices	9.50	-5.38	-36.13
NYS	11.13	7.00	Analog Devices Inc.	9.75	-0.75	-7.14
OTC	15.13	6.75	Atmel Corp.	9.50	0.00	0.00
OTC	14.13	6.38	Chips and Technologies (L)	7.13	0.00	0.00
NYS	22.63	8.38	Cypress Semiconductor Corp	8.38	-0.63	-6.94
NYS	9.75	6.25	Dallas Semiconductor	8.38	-0.38	-4.29
OTC	68.75	38.50	Intel Corp.*	52.75	3.25	6.57
NYS	9.88	6.25	LSI Logic Corp.	6.50	-0.25	-3.70
NYS	22.38	10.88	Micron Technology	13.38	-1.75	-11.57
NYS	83.75	54.00	Motorola Inc.*	75.75	-4.25	-5.31
NYS	11.50	3.88	National Semiconductor*	10.00	-0.63	-5.88
OTC	27.00	13.00	Sierra Semiconductor	15.00	-1.50	-9.09
NYS	40.50	26.00	Texas Instruments*	34.38	-2.63	-7.09
OTC	10.50	5.88	VLSI Technology	7.50	-0.13	-1.64
OTC	12.50	3.75	Weitek	4.00	-0.25	-5.88
ASE	5.63	2.00	Western Digital Corp.	4.63	-0.38	-7.50
OTC	32.50	18.63	Xilinx (L)	18.75	-2.00	-9.64
OTC	11.50	4.38	Zilog Inc.	7.00	-0.13	-1.75
Peripherals and Subsystems						**Off 6.65%**
OTC	2.00	1.00	Apertus Technologies	1.47	0.03	2.16
OTC	10.00	2.75	Archive Corp.	7.25	-0.63	-7.94
OTC	24.50	11.25	Blanchec Inc.	22.25	-1.25	-5.32
OTC	23.50	5.25	Cambex Corp.	11.88	-1.13	-8.65
ASE	17.25	7.00	Cognitronics Corp. (H)	16.75	-0.13	-0.74
NYS	23.88	12.50	Conner Peripherals*	18.50	-5.00	-21.28
ASE	19.66	3.28	Dataram Corp.	12.38	-2.13	-14.66
NYS	18.63	4.88	EMC Corp.	16.38	-0.88	-5.07
OTC	9.38	4.75	Emulex Corp.	6.75	-0.13	-1.82
OTC	23.00	14.75	Evans & Sutherland	15.38	-1.13	-6.82
OTC	40.63	13.38	Exabyte	27.88	1.38	5.19
OTC	27.25	15.75	Intelligent Info. Systems	21.88	-1.38	-5.91
OTC	11.25	4.00	Iomega Corp.	5.75	-0.38	-6.12
OTC	34.75	14.50	IPL Systems Inc.	19.00	-1.00	-5.00
OTC	24.50	11.75	Komag Inc.	12.38	-1.13	-8.33
OTC	14.00	1.63	Maxtor Corp.*	8.75	-1.38	-13.58
OTC	12.63	5.50	Micropolis Corp.	8.75	-1.25	-12.50
NYS	98.75	83.50	3M Co.	96.00	-0.50	-0.52
OTC	8.75	3.50	Printronix Inc.	5.00	0.00	0.00
NYS	26.75	8.50	QMS Inc. (L)	8.50	-0.25	-2.86
OTC	18.00	8.88	Quantum Corp.	12.63	-1.25	-9.01
OTC	12.25	5.00	Radius Inc.	10.38	-1.13	-9.78
NYS	12.88	5.88	Recognition Equipment	8.13	-0.88	-9.72
OTC	13.13	5.38	Rexon Inc.	9.75	-1.00	-9.30
NYS	17.63	7.13	Seagate Technology*	14.00	-2.38	-14.50
NYS	78.00	32.25	Storage Technology*	33.38	-3.25	-8.87
NYS	30.88	16.00	Tektronix Inc.	19.13	-0.13	-0.65
NYS	82.25	51.50	Xerox Corp.	67.88	-3.25	-4.57
Services						**Off 3.12%**
OTC	25.00	16.25	American Mgmt. Systems*	23.00	0.50	2.22
NYS	5.38	2.88	Anacomp Inc.	3.75	0.13	3.45
OTC	19.00	12.00	Analysts Int'l	16.50	-0.25	-1.49
NYS	49.00	30.25	Auto Data Processing*	42.25	-2.50	-5.59
NYS	24.16	12.50	Comdisco Inc.*	14.50	-0.50	-3.33
OTC	13.50	7.75	Computer Horizons	9.50	0.13	1.33
NYS	84.88	52.25	Computer Sciences*	63.50	-2.75	-4.15
NYS	10.13	7.00	Computer Task Group	8.13	-0.13	-1.52
OTC	19.25	7.75	Corporate Software	12.38	-0.38	-2.94
OTC	30.75	12.75	Egghead Discount Software	19.25	0.25	1.32
NYS	33.06	23.06	General Motors E (EDS)*	26.75	-1.25	-4.46
OTC	30.38	8.63	Intelligent Electronics	8.63	-0.75	-8.00
OTC	14.88	2.50	Marcam	9.13	-1.88	-17.05
OTC	15.75	5.75	Microage Inc.	10.50	-0.75	-6.67
OTC	27.50	13.50	Paychex	22.25	0.00	0.00
NYS	73.00	46.25	Policy Management Sys.	62.25	-1.13	-1.78
NYS	43.50	19.63	Reynolds and Reynolds	40.13	-1.13	-2.73
OTC	32.00	21.25	SEI Corp.	23.50	-2.75	-10.48
OTC	24.38	17.00	Shared Medical Systems	17.25	-0.38	-2.13
OTC	24.88	13.50	Sungard Data Systems	23.63	-0.38	-1.56
OTC	5.63	1.13	Ultimate Corp.	1.63	0.00	0.00

Note: Microsoft completed a 3-for-2 stock split.

KEY: (H) = New annual high reached in period (L) = New annual low reached in week

* Companies tracked in Computerworld Stock Index

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IN BRIEF

IBM forms training unit

■ **IBM** last week spun off a subsidiary to offer education and training services to IBM customers and other organizations. Skill Dynamics in Thornwood, N.Y., run by IBM Vice President Ralph W. Clark, offers services such as instructor-led or computer-based training at customer sites or IBM locations. The company expects to expand its offerings to include education consulting, quality improvement, industrial training and information technology.

■ **Bull HN Information Systems, Inc.** last week disclosed two equipment and integration services contracts — totaling $15.5 million — with the New Jersey Department of Treasury. Under one contract, Bull will supply dual DPS 9000 systems and peripherals for a benefit eligibility system; under the other contract, the company will provide 63 DPS 6000 workstations that it will install on a statewide network connected to a mainframe complex.

Short takes

■ **IBM Canada Ltd.** has entered into negotiations to form an East Coast Canadian outsourcing company with **Datacor Atlantic, Inc.** and **ISM Information Systems Management Corp.**, an IBM Canada affiliate. . . . Paul Low, **IBM**'s vice president and general manager of its general technology products line of business, will retire after 35 years, effective June 30. He will be succeeded by Vice President Michael Attardo. . . . **Microsoft Corp.**'s board of directors last week authorized the continuation of the company's limited stock purchase program through the fiscal year ending June 30, 1993. . . . **Digital Equipment Corp.** recently opened a subsidiary in Kiev, Ukraine.

DEC buys into broadcasting

BY MELINDA-CAROL BALLOU
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp., seeking to garner a greater share of the broadcast and ultimately the digital television market, last week acquired Basys Automation Systems from Independent Television News in London. Terms of the deal were not disclosed.

Basys is the largest supplier of news and management systems for the broadcast industry and holds an estimated 70% market share, according to DEC officials.

DEC said the acquisition will expand the company's presence in the emerging market for digital TV via products such as multimedia archives.

"As we move into the '90s and the next generation of TV, broadcasters will want to archive multiple data types to have digital storage, which is archived and searchable," said Jean Gard, broadcast and cable network marketing manager at DEC.

DEC's Network Application Support and impending reduced instruction set computing-based Alpha machines will respectively provide the application services and computing bandwidth required to quickly process and archive the large amounts of data generated by multimedia applications, Gard added.

Although DEC is currently retrenching and contemplating significant layoffs as a result of financial distress, the company views digital video as a key growth opportunity, according to industry analysts.

"DEC has its eye on a future in which video goes digital, and like IBM, would like to be the company that provides the substantial computing resources required to handle all that digital video," said Jonathan Seybold, president of Seybold Seminars, a consulting firm in Malibu, Calif.

Basys users responded favorably to the acquisition.

"We're using some of the multimedia functions now, but they need to be updated and improved, and DEC has the commitment and resources to do that," said Mike Johnson, corporate director of management information systems at Cable Network News in Atlanta.

Basys' newsroom, archive and machine control and management systems run in client/server mode using DEC VAX/Ultrix or VAX/VMS in conjunction with client personal computers or terminals.

BASYS AT A GLANCE

- **1991 revenue:** approximately $38 million.
- **Employees:** 160.
- **Customers:** 400 user sites including BBC, ABC Network TV and Radio, CNN, Fox News Service, CBS Network News Bureau, NBC Network TV and the News Channel.

Silicon Valley foes team up to improve living conditions

BY JAMES DALY
CW STAFF

BURLINGAME, Calif. — Some of the industry's fiercest competitors have banded together here to solve the area's most troublesome common problems, including soaring housing costs, nightmarish traffic and a struggling education system.

The firms and faces involved in "Joint Venture: Silicon Valley" are worried that the once-irresistible area is becoming increasingly resistible.

For example, they have watched local job growth decrease and lucrative electronics jobs move elsewhere. In recent years, high-tech centers in places such as Denver, Seattle, Phoenix, Portland, Ore., and Austin, Texas, have proved far more alluring than the crowded and costly Bay Area.

"This is a wakeup call to the valley," said Tom Hayes, a spokesman at Applied Materials, Inc., which is part of the group. "The old image of the cowboy Silicon Valley entrepreneur is fading. We need a new era of collaboration because there is so much more we can achieve together than working individually."

Included among the dozens of high-tech companies that have enlisted or are evaluating "Joint Venture: Silicon Valley" are Apple Computer, Inc., Hewlett-Packard Co., IBM, Tandem Computers, Inc., The Ask Cos., Intel Corp. and Cypress Semiconductor Corp. The group also includes noncomputer firms.

The coalition seeks to raise upward of $500,000 for the project primarily by soliciting individual company donations of $25,000 or more, causing some companies to look before they leap.

"We're interested, but they need to put together a list of very specific steps to address the problems before we fully commit," said Gene Endicott, an HP spokesman. "It doesn't help to simply outline the problems — we need to know what the problems are."

The first phase of the group's work will be presented at a luncheon tomorrow, when it plans to release the results of preliminary research conducted on these problems by SRI International, a Menlo Park, Calif.-based research firm.

Employment growth in the region since the mid-1980s has been bleaker than generally perceived, according to the SRI report. Since 1984, new jobs in the valley have increased only 4.9%, compared with 13.3% nationwide.

"Silicon Valley jobs have been slowly evaporating for nearly a decade," Hayes said. "We are well into a major restructuring of the local economy and the long-term trends are troubling."

The result: an erosion of the area's rich talent pool. According to the survey, 47% of those questioned see fewer opportunities here than they did only five years ago.

The report is expected to spur "a series of very specific initiatives and partnerships that we think are needed to shore up existing strengths and stimulate other portions of the economy," Hayes said.

Some analysts are skeptical of the alliance. "There is nothing wrong with getting all their own ducks in a row, but they have to make sure that they work with the communities and don't come off as another special interest group," said Lenny Siegel, director of the Mountain View, Calif.-based Pacific Studies Center research group.

"Perhaps they could get more done if they'd meet with the people who represent the local communities — the ethnic organizations, the labor groups, the environmental groups — [rather] than just issue a sweeping report," he said.

Conner eyes expansion

BY MICHAEL FITZGERALD
CW STAFF

SAN JOSE, Calif. — Hard drive maker Conner Peripherals, Inc. is looking to expand its horizons and its sales by pushing beyond OEM disk drive sales into different areas of the storage market.

Besides announcing five new lines of hard disks last week, Conner said it would work with 3M Co. to develop a high-end tape drive product. The company also created two new divisions, one to build its retail sales channel, the other to work on bundling software. Conner said it will put software from Microsoft Corp. and Central Point Software, Inc. and probably other companies on its hard drives.

"We felt we needed to expand the company," said William J. Schroeder, Conner's vice chairman. "So, we decided to think of ourselves in the storage business and to start to make that happen."

Schroeder said Conner was influenced by the example of the railroad industry, where management thought strictly of railroads, not the transportation business as a whole, and suffered in the face of competition from trucks and airplanes.

Analysts praised Conner's strategy. "We're very impressed," said Fara Yale, a senior industry analyst at Dataquest, Inc. in San Jose, Calif. "It's a stunning set of new storage products, and we believe the overall announcement will help grow the company."

Conner's new lines of drives include the highest capacity 3½-in. drives now available and a 1.6G-byte unformatted drive. Conner will also sell two lines of low-profile 3½-in. drives, a line of 2½-in. drives and a line of 1.8-in. drives that start at 32M bytes of storage capacity.

"The five different products they're announcing are all very appropriate to keeping Conner in the first tier of drive producers in the PC and workstation market," said James Porter, president of Disk/Trend, Inc. in Los Altos, Calif.

The one piece of the announcement that gave analysts pause was the tape drive agreement with 3M, largely because Conner revealed few details.

Analysts speculated that Conner and 3M will try to produce a high-capacity tape drive aimed at market leader Exabyte Corp., based in Boulder, Colo.

Phew!

"Calling with your card is easy. Simply dial (800) 347-3000 to access Sprint's nationwide digital fiber-optic network. At the tone, enter 0 plus the area code and phone number you are calling, then your 16-digit Discover card number and finally your personal access code listed above." – *From a joint ad for the Sprint and Discover cards*

SECRET ACRONYMS

ONLY THE IS DEPARTMENT KNOWS

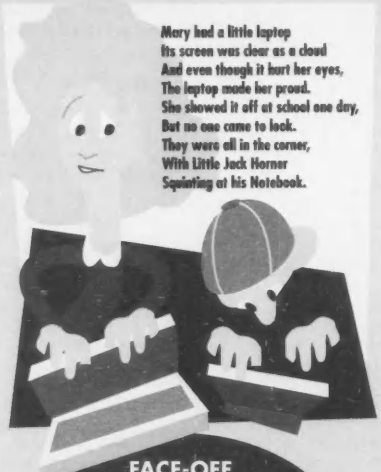
"After we take a support call, we must enter into our documentation the cause of the problem. Oftentimes, we'll enter PEBKAC – Problem Exists Between Keyboard and Chair." – From an IS support person for a large oil company in Texas

Sources: "The Gauge," The Delahaye Group; Mt. Xinu, Inc., Berkeley, Calif.

Do you have anecdotes about your users, your boss or your job? Know any industry trivia? If so, please contact Lory Zottola or Jodie Naze at (800) 343-6474. If we use your ideas, we'll send you a gift.

DID YOU KNOW?

Boris Babayan, considered to be the top computer designer in the former Soviet Union, is currently finishing the design of his supercomputer, the Elbrus III, at Sun Microsystems.


Mary had a little laptop
Its screen was clear as a cloud
And even though it hurt her eyes,
The laptop made her proud.
She showed it off at school one day,
But no one came to look.
They were all in the corner,
With Little Jack Horner
Squinting at his Notebook.

FACE-OFF

Below are well-known competitors with the number of times their names have appeared in a random sample of the 1992 consumer press

MICROSOFT: 7,610	LOTUS: 3,512
IBM: 11,462	APPLE: 6,116
SYNOPTICS: 362	CABLETRON: 331
HARE: 1,109	TORTOISE: 483
Harvard: 10,281	YALE: 4,[illegible]

What was your reaction to IBM's announcement of its first loss in history?

Number of respondents

- EXPECTED: 37
- SHOCK: 3
- CONCERN: 3
- SURPRISE: 3
- IT'S ABOUT TIME: 2
- NOT AN ISSUE: 2
- GOOD TIME TO BUY STOCK: 1

Base: 51 members of Sierra/First Boston MIS Council

Read it and weep

"Bulldog Reporter," a newsletter based in Berkeley, Calif., has begun a study of unwanted press releases by monitoring those received by selected journalists. Results so far show that the majority of unwanted press releases are for new products or about new staff or promotions.

WYSIWYG design and illustration: Tom Monahan

INSIDE LINES

Blood transfusion

▶ A top-level management shift at Oracle is due this summer. Speaking after the Oracle 7 debut in New York last week, Oracle CEO Lawrence Ellison said three new executives would be named to top management posts by summer's end. It is not clear whether any current Oracle execs will be fired. "Oracle has traditionally been too inbred," he explained. "We want more experience and more depth." However, Ellison plans to stick around to run things: "I will remain president and CEO, and there will be no chief operating officer." The future inhabitants of Oracle's top floor are likely to come from multibillion-dollar firms, he said.

Perot-gate?

▶ An intruder erased the database of information on about 17,000 Virginia supporters of presidential contender H. Ross Perot, according to Mark Brown, director of technology at Perot's Virginia campaign headquarters in Richmond. Brown says he came into work June 14 to find two PC hard disks erased, as though they had been reformatted. Fortunately, Brown — who describes himself as "a hacker who goes way back to the Altair systems you put together yourself" — makes a daily tape backup of the database.

There is no evidence that political competitors did the deed, but it came eerily close to the 20th anniversary of the Watergate burglary.

Spreading out

▶ Lotus is planning to extend its Realtime financial data feed software to additional Unix platforms at an announcement next Monday at the Securities Industry Association Show in New York. Joining Lotus at the event will be Next's Steve Jobs as well as an IBM executive from the Advanced Workstations and AIX Systems Group. A Lotus source said the company also plans to extend Realtime support beyond 1-2-3. For instance, Realtime is currently supported by 1-2-3 for Sun SPARCsystems, allowing users to download financial data directly into the spreadsheet.

Personal Windows

▶ Microsoft's WinLogin — software that will enable Windows users to be greeted by their own configuration no matter where they log on to a network — should be available by the end of August, according to sources. Users seemed enthusiastic about the idea. "I like it," said Craig Goldman, CIO at Chase Manhattan Bank. "We have a lot of mobile people." Users would be able to log in and see their familiar Windows setup from any machine, saving time spent reconfiguring.

Baked Apple

▶ Apple plans to open a major customer support and service center in Austin, Texas, by the end of July, company sources say. The center will have nearly 400 employees by year's end — many of whom will have relocated from the company's Campbell, Calif., customer service center. The facility will primarily handle order processing and technical calls from dealers. Additionally, Cupertino, Calif.-based Apple will purchase nearly 200 acres of nearby industrial land on which it will build a larger permanent home for the center.

How do you cure an itch for expansion into the promising HMO outsourcing market? For Electronic Data Systems, the prescription could turn out to be this: "Take two huge Massachusetts health care organizations and call me in the morning." Last week, $3.2 billion Blue Cross/Blue Shield of Massachusetts, which signed an $800 million, 10-year outsourcing pact with EDS in January, bid to merge with Bay State Health Care, an HMO with shaky finances and a solid subscriber base. While stressing that "it's way, way too soon" to talk about EDS' role in the proposed combined organization, an EDS spokesman confirmed that EDS will be there in some capacity. "We are Massachussetts Blue Cross/Blue Shield's technology partner," he noted, "and we know the HMO business." Phone, fax or CompuServe News Editor Alan Alper with news tips at (800) 343-6474; (508) 875-8931 or 76537,2413, respectively. Or try Computerworld*'s 24-hour voice-mail tip line at (508) 820-8555.*

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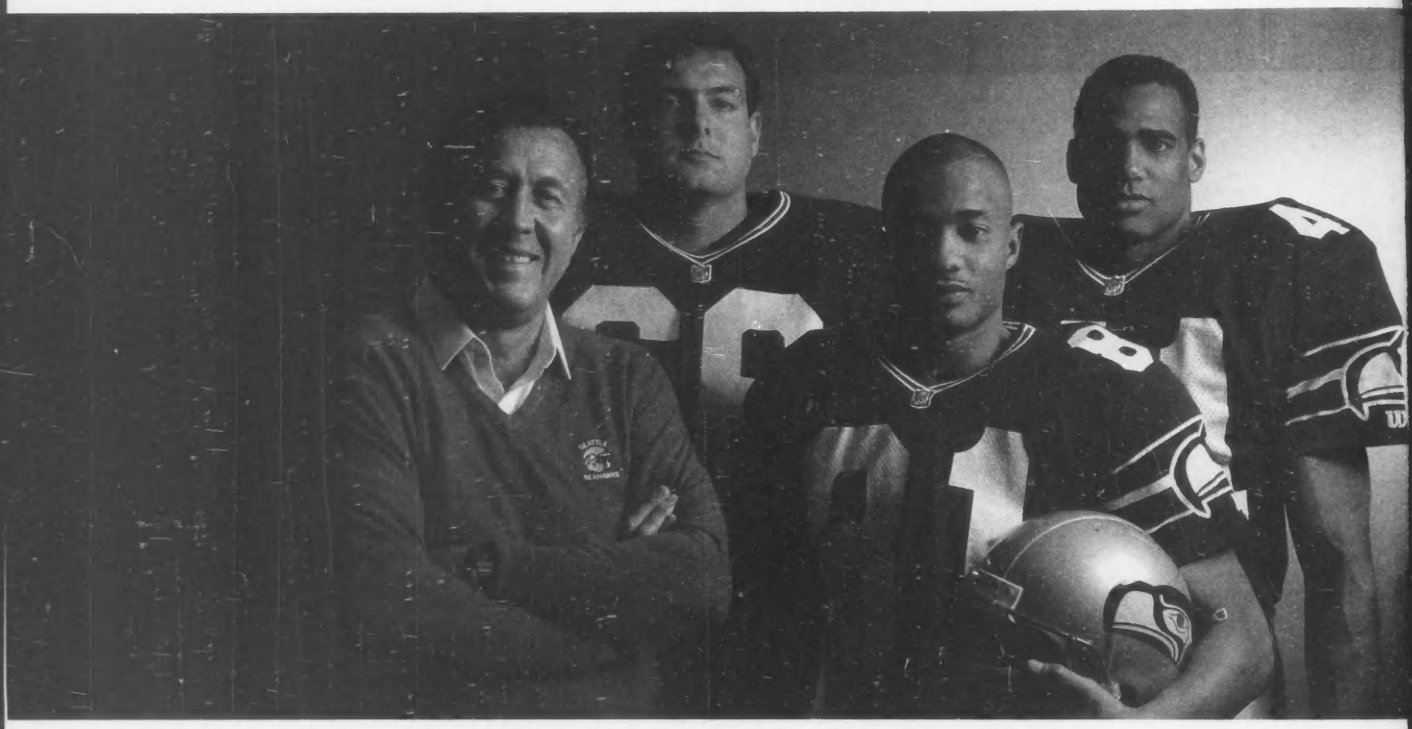
Informix Database Technology Helps The Seattle Seahawks Score Big In The NFL.



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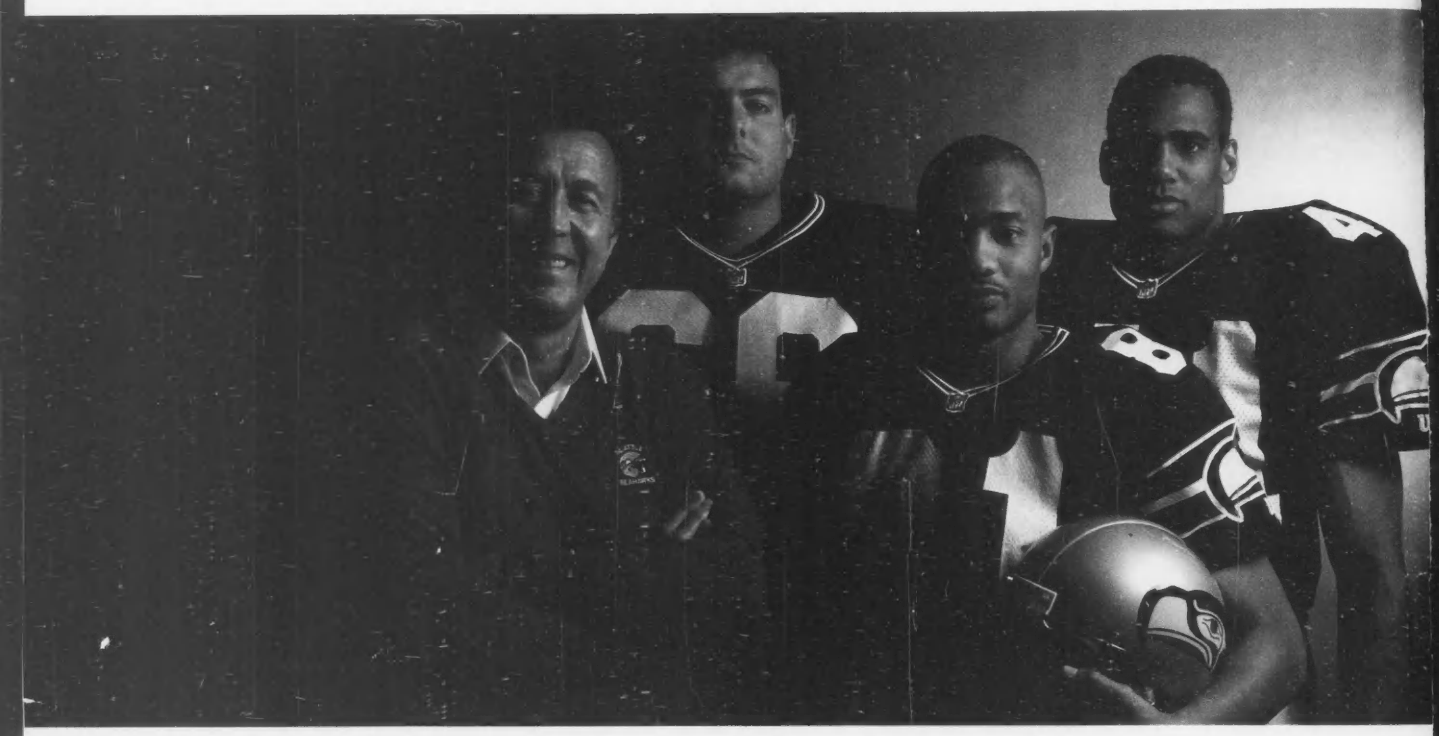
Informix Database Technology Helps The Seattle Seahawks Score Big In The NFL.



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When the NFL's Seattle Seahawks wanted quick access to information that would help them make better competitive decisions, they turned to us, Informix, the experts in UNIX relational database technology.

A Strategic Move To UNIX.

The Seahawks, a pioneer in bringing sports franchise operations on line, made a decision to move their proprietary database to a flexible UNIX system. The new system had to store and track vast amounts of data, including statistics on virtually every football player on a college or professional level worldwide. The system had to be technically sophisticated, comprehensive, and easy to use by front office and coaching staff alike.

The Seattle Seahawks chose the Informix UNIX solution.

Running Operations Throughout The Franchise.

The Informix database tracks player statistics from college through professional football. Seattle scouts use laptops in the field and download their reports directly into the central database over phone lines.

The Seahawks also record and track all injury and treatment records, and analyze individual and team playing tendencies. Accounts payable and receivable are run on an application developed by an Informix VAR. And the Seahawks' newest in-house application is one that tracks all season ticket holder information.

The Seahawks and thousands of other organizations have called on us for 12 years to successfully handle their critical data.

If you're considering UNIX for data management, talk to Informix. Because we're the experts.

Call 1-800-688-IFMX.

INFORMIX®

THE UNIX DATABASE EXPERTS.

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